POPULATION MOBILITY AND ECONOMIC DEVELOPMENT
IN EASTERN INDIA

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Preface

POPULATION Geography is concerned with the spatial pattern of population phenomena in the context of aggregate nature of places. Spatial variations in population, no doubt, are function of a host of physical, economic and cultural factors, but they operate through the dynamics of population change. Besides fertility and mortality, migration is the only source of population variation in any area. Population mobility is closely related to economic development. In short-run, it in itself is, to a great extent, a result of regional disparity in economic development. In the long run, however, population mobility in the form of migration influences regional economic development. Interpretation of the pattern of population mobility is, therefore, an important aspect of Population Geography. Such a study is particularly needed in a country where a conscious effort is being made to change the functional character of population and improve its standard of living.

Very little work, however, has been done on this aspect of Population Geography in India. The present study is aimed mainly at finding out economic causes of population mobility in Eastern India.

Eastern India has been chosen as the field of study, because it contains one of the most underdeveloped and overcrowded rural agricultural areas, on the one hand, and the most urbanized and industrialized tracts with ample employment opportunities on the other. It is thus a region of both economic and demographic contrasts.

I am extremely grateful to my supervisor Dr. P. Dayal, University Professor and Head of the Department of Geography, Patna University, Patna for developing my interest in Population Geography, specially in Population Mobility. His constant guidance and encouragement enabled me to complete the research work expeditiously. I am also thankful to Dr. L.N. Ram, Reader in the same Department for constant guidance, encouragement and valuable suggestions, without which the work would not have been completed. I am also obliged to Dr. B. Thakur, Lecturer in the same Department for giving orientation to theoretical studies and also for practical help in a number of ways. I would be failing in my duty if I do not thank Dr. V.N.P. Sinha of the same Department for his encouragement even while abroad. My thanks are also due to Dr. Rameshwar Pd. Singh, Member, Bihar University Service Commission and formerly Reader in

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POPULATION geography deals with the spatial pattern of population phenomena in the context of aggregate nature of places.[1] In other words, it is concerned with demonstrating how spatial variations in growth, distribution and composition of populations are related to the spatial variations in the nature of places.[2] Spatial variations in a population, no doubt, are a function of a host of physical, economic and cultural factors. They operate through the dynamics of population change. Besides fertility and mortality, population migration is the only source of regional variations in population phenomena. It influences regional population growth, organization of a population over space and its composition, etc. In the short run, it is to a great extent, a result of spatial disparity in economic development. In the long run, however, population mobility, in the form of migration, affects regional economic development. It has varied effects on the areas of emigration and on those of immigration. A population, the size and composition of which are largely determined by migration, present unique features—demographic, economic, social and political. Interpreting the pattern of population mobility is, therefore, an important aspect of population geography. Such studies are particularly needed in a country where a conscious effort is being made to change the functional character of population and improve its standard of living.

The movement of people is older than recorded history. Man is a mobile creature, susceptible to suggestions and endowed with imagination and initiative. Population mobility is an important feature of developing as well as developed parts of the world. There are definite patterned regularities in the growth of mobility and this comprises essential components of modernization.[3] Population mobility has increased with technical and economic progress.[4] Each movement provides an important network for the diffusion of ideas and information. It indicates a system of social and economic change, and can be regarded as a form of human adjustment to economic, environmental and social problems.[5]

Types of Population Mobility

There has been relatively limited attempt to classify population movements. Probably, the best known work on the typology of population mobility (migration) is that of Petersen.[6] It is primarily based upon socio-economic factors. He differentiates population movements on the basis of the types of interaction (e.g., nature of man, state of man), the migrating force (e.g., ecological push, migration policy, aspirations), the class of migration (e.g., free, impelled, mass), and the type of migration (whether 'conservative', e.g., nomadic movements or 'innovating', e.g., pioneer movements, urbanization). He further classifies types of migration according to the selective character of migrants (e.g., younger adult males, dissident groups), within the two major groups, conservative or innovating. Spatial aspects are implied but not explicit in these classifications. While temporal aspects have been completely ignored.

Kant[7] has given a review of a number of classifications including his own. It is of relatively generalized nature. He has noted broad distinctions between *Inter-continental* and *Intra-continental* migrations, and between international and internal migrations. His further classification of intra-country or internal migrations may be summarized as follows :

I.   Intra-local or intra-regional migrations :
     (a) Intra-urban migrations, and
     (b) Intra-rural migrations.

II. Inter-local or inter-regional migrations :
     (a) Migration by change of environment or milieu, and
     (b) Migration between similar parts of a country.

In this classification, the differentiating role of spatial aspects has been considered but categories are too generalized to be of assistance in the analysis of the movements of complex character.

Beltramone's[8] typology takes into account both spatial and temporal aspects. It is based on a major distinction between permanent movement and temporary movement. Further differentiation has been made between those which occur within and between administrative units of different scale. In the category of temporary movements, further distinction has been made between those which are regular in time (daily, weekly, seasonal) and also in space, and those which are irregular in both time and space.

Zelinsky[9] has emphasized the need for greater attention to spatial and temporal dimensions in the study of population movements. These have been neglected by social scientists, who have tended to concentrate more on the socio-economic characteristics of migrants and on the socio-economic implications of population mobility.

Prothero and Gould[10] have attempted to provide a working typology of population mobility. According to them space and time dimensions are the essential framework for any geographical typology of population mobility. Space may be considered in one of the two respects : *distance* or *direction*.

Distance may be measured in physical terms (as in Ravenstein's classic classification)[11] or in economic terms (as in Stouffer's concept of intervening opportunities)[12] or as within or between administrative units (as in Beltramone's typology).[13] The last of these differentiates the distance continuum through successively larger scales of interaction : from the commune to the national and international community. They can be referred to as intra- or inter-village movement, or as intra- or inter-district movement, and extended to intra-national and international. Differentiation of this sort is certainly more satisfactory than measures of a distance continuum in terms of short and long, since they are relative terms and it may be impossible to apply them in comparative analysis.

Direction may be most satisfactorily considered in terms of rural/urban relationships. Rural and urban areas represent the opposite ends of a continuum. Time may also be considered in two ways :

(1) In *Historical Terms*[14] :

(a) Movements that took place formerly but which have now ceased.

(b) Movements that have been continued from the past to the present, and

(c) Movements that have developed in recent times, e.g., within the present century.

(2) In contemporary terms as measured by the periodicity of the movement which may involve a continuum from repeated movements of a few minutes duration within a limited area to a permanent change from one place to the another.

The basic framework of the typology is shown in the following Chart[15] 1.1. It considers space in four categories of rural/urban relationships and time in the span of each movement.

		Population Mobility						
		Time						
		Circulation				Migration		
		Daily	Periodic	Seasonal	Long-term	Irregular	Permanent	
Space	Rural-Rural Rural-Urban Urban-Rural Urban-Urban							

Chart 1.1

Fundamental to the typology is the distinction made between the terms *mobility, migration* and *circulation*. Mobility is a sufficiently broad term to include all population movements from the one extreme of those made several times each day, e.g., to fetch water from a nearby well, to others of a definite direction involving intercontinental movements over several thousand miles. Migration is sometimes used by some demographers in this broad general sense to include all types of movements, but others consider it to be more limited in scope than mobility. Lee[16] excludes movements such as those of seasonal workers and tourists, etc., from migration. Most definitions of migration refer to permanent change of residence. Movements which do not involve any permanent change of residence are of a rhythmic or oscillatory nature. These movements can be suitably designated as circulation and include a great variety of movements usually short-term, repetitive or cyclic in character but all having in common, the lack of any declared intention of a permanent or long standing change of residence.

The principal difference between *migration* and *circulation* lies in the permanence of the former and · the non-permanence of the latter. However, *permanent* has been defined in different ways. The period of time implied by the term permanent cannot be generalized in all instances of migration.[17] No broad specification of the duration of stay suits all purposes.[18] Other discussion of permanence such as that by Van Velsen[19] have considered economic and social commitments of a mover to a distination compared with those to his home areas. Thus, there has not been any universally accepted criterion for defining permanence. It is suggested that if there is a specific desire on the part of the individual or group of individuals, who are moving, to return to their place of origin, the movement may be considered circulation rather than migration. Some movers, however, know only the timing or the direction of future movements or are unsure of any definite desire.

Circulation : Circulatory movements have been subdivided according to the length of their cycle into four main groups—daily, periodic, seasonal and long-term.

Daily circulation includes a great variety of intra-rural and intra-urban movements. Daily movements have become an increasingly important component of population mobility in recent years. They are closely associated with the growth of towns and increase in transportational facilities.

Periodic circulation may vary in length from one night (e.g., for a visit to a relative or to a market) to one year, though it is usually shorter in duration than seasonal circulation.

Seasonal circulation is in fact a periodic type of movement, the period being more rigidly defined by marked seasonality in the physical

or economic environment. Seasonal circulation does not include local movements with a high seasonal incidence (e.g., movements of farmers to sell their produce in market) but movements which involve individuals or groups being absent from their permanent homes throughout a particular season of a year.

Long term circulation involves absence of more than one year from home. It includes important groups, usually of wage labourers and traders, who despite long absence maintain close social and economic links with their home areas with the objective of eventually returning to them.

Migration : The presence or absence of permanence in movement is the basis for distinguishing between migration and circulation. However, different interpretations of "permanent" have given rise to two types of migrations ; permanent and irregular. *Permanent migration* (in conventional usage of the term) indicates definitive movements with no propensity to return to the home area. *Irregular migration*, on the other hand, is not wholly permanent. Further movement is likely in the future, but neither the time nor direction of such movement are known. This subcategory includes the movement of nomads and refugees.

Significance of Population Mobility

Population mobility, particularly migration is one of the dynamic constituents of population change. Population, the size and composition of which are largely determined by migration, presents unique features—demographic, economic, social and political.[20] Migration has varied effects on these aspects both in the areas of emigration and the areas of immigration.[21]

Demographic Effects : The size, growth rate and age, sex and occupational composition of a population are functions of the dynamics of population change. Except natural increase, migration is the only source of population change.[22]

The Size of Population : The size of a population depends upon the natural increase and redistribution of the population accomplished by migration. The natural increase is responsible for the overall growth rate of a population, but regional growth rates results from both differential natural increase and migration leading to redistribution of the population.

Growth Rate : Population dynamics of natural increase and migratory increase are very different. This difference is in relation to age and sex structure due to selective migration. The age structure is weighted towards the younger ages under conditions of natural increase and towards middle or productive ages under conditions of migratory increase because of the predominance of adult migrants.[23] Migration also influences considerably the sex structure of the sending and receiving areas, leading to higher sex-ratio in the former case and lower in the latter.

Thus, population does not conform to any simple law of increase where population composition is largely a function of migration. Migration upsets the age and sex structures leading to disturbances in normal family life and consequently fertility pattern. Due to lower sex ratio in the areas of immigration the birth-rate may be even lower than the death rate leading to negative natural increase.[24] However, where families are involved in migration the influx of people in productive age-groups contributes to an increase in birth-rates. The new comers do not immediately adopt urban family patterns, and high fertility exist among them for some time.[25]

Economic Effects : Population mobility, particularly migration influences regional economic development in the long run.[26] Population influences economic growth through the effects upon the basic economic inputs of land, labour and capital. The supply of land is affected by the pressure of population. The growth of employment depends upon both supply and demand side. From supply side it is influenced by the size and growth of population and from demand side, by the level of employment generating investment in the non-agricultural sector. Investment, in turn is affected by the impact of population upon saving, and in shaping the composition of investment via its role in determining the alternative demands for investment, e.g., in schools, houses or directly in productive activities. A larger share of children requires higher investment for providing educational facilities. Thus, population tends to influence the structural character of a developing economy. Fertility reduction yields an economy with larger industrial, transportational and communicational sectors, i.e., more developed and modern sectors that are suited to economies of large scale production. On the other hand, a rapid population growth hinders, to a moderate extent, the emergence of a market structure, patterned along modern lines. However, fertility is neither a pre-requisite nor a constant high fertility a barrier to economic development.[27]

Population, thus has a dual role with economic development as related to consumption and to supply (supply of manpower).[28] Consumption depends upon the size of population and its standard of living. High consumption provides a large market and thereby a benefit of large scale production, but retards capital formulation so essential for investment. The supply of manpower or dependency rate is a function of age-structure. Thus, the size and age-structure of population are vital for regional economic development, which in turn are dependent upon the dynamics of population change.

Migration has differential effects on sending and receiving areas,[29] it relieves the pressure of population on land resources in the former and increases it in the latter. It aggregates the persons of working age-groups

in the receiving areas and leaves behind large number of dependents (children and old persons) in the sending areas. In an area of outmigration the marginal productivity of labour may increase. If the marginal productivity of emigrants is lower than the average for the area, per capita income of the remaining labour force may increase, provided the outflow is not drastic. Otherwise, there will be further decline in the marginal productivity, and an acute shortage of labour will occur in the sending area. On the other hand, the influx of unskilled labour to a highly developed region reduces per capita income and, in short run, retard economic development of the receiving region. In the long run, however, they prove beneficial if adequate facilities for their training and employment are made available.[30]

Social Effects : Each movement provides an important network for the diffusion of ideas and informations, indicating the symptoms of social and economic change.[31] Thus, mobility of population will have an effect on the existing social structures. New patterns of thought and attitude of mind develop from experience gained in other places and as a result social mobility is likely to increase.[32] In a heterogeneous or regionally diverse society, therefore, internal migration can be an effective instrument of cultural diffusion and social integration.[33]

However, as a result of migration the most able members of a community may be lost completely or may be away for long periods of time, thus hindering the process of social change and limiting economic potential.[34]

The flow and characteristics of internal migrants affect social conditions in both the communities of origin and destination.[35] From the perspective of rural communities, they lose disproportionately more of their talented youngsters, but from the point of view of urban communities, they are receiving a great many rural youngsters in unskilled occupations.[36] In theory a migrant who joins a new and developing community can rapidly ascend in the economic and social hierarchy, but the rapid growth of urban slums indicates that actual material and social improvement can be difficult to achieve. In many cases social degradation occurs.[37] The rural reared migrants living in an urban place often have a lower social status (as measured by education, income and occupation, etc.).[38] In the case of immigrants to rural areas, on the other hand, migrants often insist on practising traditional methods of farming even though they may be in an environment that requires totally different treatment. The result may be catastrophic.[39]

Political Effects : A population, the size and composition of which are largely determined by migration, presents many administrative problems. The people consist of different races and creeds with totally different attitudes towards life giving birth to racial tensions and communal disputes besides other problems.[40]

Thus, for regional, national and even international planning more rapid and precise information of past movements and predictions of future movements are necessary.[41]

Review of Important Studies

Population mobility has been studied by the scholars of different disciplines, viz., demographers, sociologists, economists and geographers, etc. However, the present day theoretical and empirical knowledge of migration phenomena is very imperfect.[42] Most of the migration studies have avoided generalization and have tended to be factual reports, describing the volume of different movement revealed by the data and where possible, differential characteristics of the migrants. Among those who have attempted to generalize, two distinct approaches may be identified.[43] The first considers the differences in characteristics of the places of emigration and immigration as the starting point, in order to find out explanations of the migratory movements which may have occurred. Such studies are situation oriented in terms of push and pull factors. The other approach seeks to formulate empirical generalizations to describe patterns of migration, preferably in the form of mathematical models.

Revenstein's papers published in 1885 and 1889, entitled "The Laws of Migration"[44] are the starting point for the second approach. Although, some of his laws have been challenged or some exceptions have been discovered, his observations have provided the basis for fundamental idea underlying the gravity model of Kant and Zipf.[45] Stouffer's "model of intervening opportunities", however, contradicts the conclusion of gravity model. It denies that there is any relationship between population mobility and distance. Rather the number of persons migrating over a given distance is directly proportionate to the number of opportunities at the place of destination and indirectly proportionate to the number of intervening opportunities.[46] Various tests have been made based on Zipf and Kant models and Stouffer's model or on a variant of these models, and high correlation between expected and observed migrants have been reported.[47]

Laws and models of this kind tend to describe rather than to explain.[48] They do not even take into account all the diverse circumstances under which migration can occur. Moreover, they are incomplete so far as factors leading to migration are concerned. Ter Heide has reviewed many of the efforts aimed at overcoming these handicaps for making the models more useful.[49] One partial solution has been the use of such parameters whose values depend on situational factors. Other scholars have qualified the meaning of the factors, distance and population size, in the Zipf-Kant model and then proposed appropriate modifications.[50] Some have experimented with more elaborate mathematical models

involving, for example, stochastic process analysis with Markov Chain techniques.[51]

Somermeijer made a major improvement in the Zipf-Kant model by introducing explanatory "attractiveness factors", each of them with different values in the place of origin and in the place of destination.[52] This innovation enables the model to describe both net and gross migration instead of only the gross migration between two places. In principle, it also permit the incorporation of all the explanatory push-pull factors, supplied by the situation-oriented approach. It assumes that each factor influences a different class of migrant and allows for different subjective values for different persons within the class of migrants influenced by a given factor.[53] Lowry, acknowledging his indebtedness to Somermeijer, applied a model with nine independent variables to the analysis of internal migration in the United States.[54] Numerous studies conducted in Japan have investigated the importance of disparities in income and employment opportunities between the more urban industrial areas and the more rural agricultural areas as factors explaining internal migration.[55]

In the situation oriented approach to migration theory, explanation has been the chief objective and the push-pull hypothesis has nominated the mode of thinking.[56] In this type of analysis, migration is considered to be the outcome of the interplay and balance of expulsive forces and of attractive forces in place of origin and destination respectively.[57] The push-pull hypothesis has proved to be useful for listing all the factors affecting a given migratory movement, and has produced lucid and convincing expositions of the underlying factors in migration.[58] The approach, in and by itself, does not lead to any theory and some student of migration have questioned the adequacy of its basic concepts. The forces of accumulated push and pull factors can be so overwhelming that it neglects to make clear why some migrate and some do not.[59] The use of Lee's conceptual framework, which incorporates push and pull factors at both the place of origin and the place of destination would overcome this limitation.[60] Another difficulty with push-pull analysis emerges when an attempt is made to characterise the combined effect of all the factors as predominantly either push or pull.[61] Some scholars have avoided this kind of difficulty by observing that many push and pull factors can be matched into pairs, each pair representing two different values of one single variable.[62] Following this line of reasoning some have concluded that push-pull dimension is a subjective characteristic of migration. Whether an individual migrant thinks of himself as pushed by poor job, health, educational and other conditions in his rural habitat or is attracted by better urban condition depends in part on his own evaluation, and may well be different before and after migration.[63] However, while personal reasons and individual motivations are important during the pioneer

phases of migratory movement, they are of little importance during the mass or social movement phase. Such movement is largely sustained by initiation and inertia.[64] Nevertheless, a movement associated with rapid change only at the place of origin or only at the place of destination may be distinguished as push or pull.

An important main problem before the migration theorists is the organization of all hypothetically relevant factors into one coherent theoretical framework which will specify their interaction with each other in empirically testable form and thereby serve as a guide to future research. Generally, however, the more elaborate frameworks remain unused because of data deficiency and other difficulties in their application. Analytical systems, designed for use with a specific body of data have necessarily to sacrifice rigour and elegance of the formulation.[65] On account of the existence of diverse types of migration, some scholars have abandoned the search for universally valid generalizations in preference to construction of migration typologies,[66] as a necessary preliminary step in the development of migration theory.

Among the theoretical frameworks formulated for migration analysis, those of the economists, Schultz and Sjaastad consider internal migration in terms of cost and returns on investments in human capital.[67] The cost of investment, such as moving costs earnings foregone while searching and training for a new job and psychic costs, such as home-sickness, must be compared with the returns, such as expected better earnings, etc. Petersen, a sociologist, has emphasized the need to distinguish the underlying causes into facilitative environment, precipitants and motives.[68] Germany devised a sociological framework identifying three levels of analysis: an objective level and two subjective levels, the normative and psycho-social levels.[69] His framework is primarily programmatic indicating the kind of data to be looked for in rural-urban migration study.

In view of the complexity involved in conceptualization of the objective and subjective component of migration motivation, and the design of survey investigating them in depth, it seems that most migration studies and surveys have limited aims. Consequently, most of the researches done on migration phenomena have been of ad hoc nature. They have been oriented to specific problems, and their results are not comparable with one another. In other words, the migration theories have been time bound, culture-bound and description bound.[70]

In the circumstances stated above, it seems worthwhile to review the existing literature on trends of population migration and their probable causes in the developed world, and in developing countries separately.

Migration Studies in Advanced Countries

The ideas of inverse distance or distance decay relationships, widely developed by Zipf, Stewart, Warntz and others, have been found applicable in many kinds of movements.[71] It has been found that whereas moves cannot be precisely determined, the destinations chosen are strongly influenced by systematic forces.[7a] Vanderkamp[73] has observed that unemployment has a significant and substantial impact on the overall rate of geographical mobility in Canada, and particularly on the rate of migration to such regions in which migration add to their population. Hypotheses that inter-provincial mobility is positively related to differential provincial incomes and negatively related to distance have received impressive empirical support in Canada.[74] However, Wolpert[75] has shown the weakness of Stouffer's and other models for giving emphasis to push-pull factors and excluding behavioural parameters. He has borrowed much of the concepts in his model building from the behavioural theorists. Zelinsky has approached migration in a completely different perspective. He, in his "hypothesis of the transition mobility",[76] has applied the principle of spatial diffusion of innovations to the laws of migration, specially to Lees' assertion that "unless severe checks are imposed, both volume and rate of migration tend to increase with time.[77] The results are set within the same sort of temporal structure that has been developed for the demographic transition. The 'hypothesis of the transition mobility' can be most precisely expressed as follows: There are definite, patterned regularities in the growth of personal mobility through space-time during recent history, and these regularities are associated with the modernization process. In other words, for any specific community the course of mobility transition closely parallels that of the demographic transition and other transitional sequences. There are major, orderly changes in the form and intensity of spatial mobility at various stages of the transition. There are concurrent changes in both form and intensity of social mobility and in the movement of information. The process in question tend to accelerate in spatial and temporal pace with time because of the steady accumulation and intensification of causative factors within any given community and because of the effects of, and transfer of information from more advanced to less advanced regions. The progress of a community toward advanced developmental status can be gauged by its control over energy, things and knowledge, as exercised both individually and collectively, and also by attainment of personal mobility, i.e., widening range of option for locating and patterning one's life.

Richardson[78] has observed that migrants tend to move from low wage to high wage areas and from areas of labour surplus to those with labour shortages. In other words, net migration flows show some tendency to be functionally related to the wage or per capita income differential

between regions of destination and origin. They thus substantiate the neo-classical model.

Drewe and Rogers[79] have presented a new aggregate hypothesis which is derived from a survey of migration research. The traditional economic model of migration[80] includes more explicitly the opportunity costs of moving. Joseph[81] has used the theory of Markov Chains to formulate a stochastic model of inter-regional migration in Britain while Morgan[82] has tested the Lansing Muller hypothesis by using the in and out migration ratio of unemployed persons in standard metropolitan statistical area of the United States during the periods of 1949-50 and 1955-60.

Davis[83] comes to the conclusion that modern migrations are an ebb and flow that result from technological and economic inequalities. Glantz[84] has also observed that the poor migrate to areas offering more employment opportunities and higher welfare benefits. Cebula[85] analyzes the impact of the quality of life on inter-State migration in the United States over 1968-70 time period.

Greenwood[86] has reviewed the post-1960 literature dealing with the causes and effects of migration within the United States.

Smith[87] has developed a general probabilistic theory for modelling a variety of spatial interaction choices of individual behaving units. This theory is shown to be consistent with a wide class of empirical spatial interaction hypothesis designated as gravity hypothesis.

Studies in Developing Countries

Prothero[88] has observed in West Africa that economic opportunities in better developed areas offer an incentive for migration, but this is followed only if conditions are unsatisfactory in home areas (area of origin) for stimulating the people to take up the employment opportunities offered elsewhere. In the Philippines, internal relocation of the people is a movement down the pressure gradient,[89] from areas of high density and economic distress to the sparsely settled frontier lands. Rempel and Toddaro[90] have concluded from their experience in Kenya that the spatial allocation of labour between a rural and an urban sector is primarily a function of the differential expected income between these two sectors. Harvey[91] has found in Sierra Leone that internal migration tends to be from areas at a low level of development to relatively more advanced regions. However, Clark's experience in the Caribbeans[92] is that "mobility results more from the push from the overcrowded land of the rural parishes than from a strong pull.........from job and other economic opportunities". Amin[93] has also experienced the same thing in western Africa. Addo[94] is of the opinion that migration, both internal and international are economic, demographic, environmental, political and to some extent religious in character. Carvajal and Geithman have observed in

Dominican Republic that migration flows are strongly affected by economic conditions, both in the area of origin as well as that of destination.[95]

Studies in India

Davis[96] is probably the first scholar to study in detail migration pattern in India. He discussed the extent and direction of migration under the following heads :

    (i)   Immigration : The Foreign Trickle,
    (ii) Emigration : The Overseas Movement, and
    (iii) Internal Migration.

     He has studied in detail the volume and types of internal migration, viz., short-run migration, marriage migration and rural-urban migration etc. He has also discussed the causes of an overall immobility of the Indian population but his studies relate to 1931 and earlier periods only. Besides, he has described and discussed in broad terms the pattern of migration only between various regions of India and Pakistan.

     Dayal[97] has studied the growth of population and rural-urban migration in India. Gosal[98] has dealt with the regional pattern of the magnitude of internal migration in India in 1931 and 1951 and pattern of change during 1931-51. He has also discussed the causes for small internal migration in India. More detailed historical study of internal migration in India during 1901-31 has been done by Zachariah.[99] The work of Mitra is based on migration data of 1961 Census in his report submitted to ECAFE.[100] In this study almost all the new features of 1961 Census have been utilized to analyze different aspects of migration pattern in India. The relation between the volume of migration and levels of development have also been studied. However, there is a heavy emphasis on the discussion of intra-State migration. Bose[101] presents an overall picture of inter-State and intra-State movements and recognises four types of flows according to rural-urban composition of the migrants, but does not discuss the Statewise pattern. Similarly, Saxena[102] has analyzed the streams of inter-State migration in detail but his discussion regarding intra-State movement is confined only to all India picture. Lopo[103] has given a quantitative description of internal migration in Bihar during 1921-51 by using linear programming technique in the analysis of migration. Hussain.,[104] in her review of the Demographic research undertaken during 1966-69 in India has found that twelve per cent of the total studies undertaken were devoted to migration, and urbanization. Kumar[105] has studied the trend of inter-district migration in Bihar during 1951-61. Bhuyan[106] has discussed the types of immigrants in Assam Valley.[107] Gulati has attempted an analysis of the relationship between migrant and per capita income, urbanization, literacy and density in India at both the district and State levels.

Kumar and Sinha[108] deal with the index of migration and formulation theories related to migration. Trewartha[109] discusses migration pattern between 1941-61, particularly during 1951-61 decade and the trend of increase in population mobility during 1901-61. George[110] takes into account migration streams between rural and urban areas within Assam and West Bengal. He highlights the magnitude of internal migration in India and suggests the importance of intra-provincial migration in internal migration analysis.

Rao[111] has used the data collected by Indian Statistical Institute (July 1965 to June 1966) to apply Stouffer's model on intervening opportunities and competing migrants in India. Roy[112] has done a general empirical study of migration pattern in U.P. without any generalization on statistical grounds. Kshirsagar[113] deals only with male migrants in the fifteen States (Union territories excluded) of India during 1951-1961. She has given special emphasis to intra-district, inter-district and inter-State migration. Bose[114] presents an overall picture of internal migration in India in terms of the origin, direction and distance and volume of the migration streams. He has also discussed migration and linguistic dispersal in India. The study is based on 1961 Census data. Mehrotra's[115] study relates to the salient results of the one per cent sample tabulation of the 1971 Census. He analyses the Census data on internal migration for the whole country during 1961-71. He has extensively studied the characteristics of migrants falling under the category of birth place concept.

Scope of the Present Study

The scope of research on population mobility can broadly be divided into the following groups :

    (i)   Typology of population mobility,
   (ii)   Trend of population mobility,
  (iii)   Causes of population mobility,
   (iv)   Consequences of population mobility, and
    (v)   Characteristics of the mobile persons.

The present study is limited, however, only to the following problems :

    (i)   Whether volume of migration is higher over short distances ? Lee's theory regarding distance covered by migrants is true for Eastern India, the area selected for study, during 1961-71.

   (ii)   Whether population mobility increases with overall development, i.e., the Hypothesis of Transition Mobility of Zelinsky holds good for the study area ?

  (iii)   Whether migration tends to be from areas of law level of economic development to economically more developed regions in the study area ?

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2

The Study Area : Its Geographical and Economic Base

EASTERN India has been chosen as the study area for testing the hypotheses formulated earlier. This term has been used to denote the States of Bihar, Orissa and West Bengal. The north-eastern States and the Union Territories have been excluded from the study area on account of two considerations. Firstly, the study is limited to the period between 1961 and 1971 during which there has not been large scale internal migration in the north-east. Assam plain was, of course, a centre of attraction for migrants during the pre-independence period on account of the development of tea gardens. But later on its interaction with rest of the area has decreased considerably due to filling up of the empty plain and lack of marked industrialization in the area on the one hand, and immobile character of the Assamese who might have contributed to the migratory force towards industrial centres of the Chota Nagpur Plateau on the other. Secondly, a large amount of data for this area is simply not available. Hence, this area had to be excluded from the study area.

Eastern India, has regions of varying resource potential and is marked by varying levels of development leading to diverse employment opportunities. It has economically under-developed and overcrowded rural areas (e.g , Bihar Plain) on the one hand, and growing industrial centres (viz., industrial areas of Chota Nagpur) with ample scope of employment on the other. It is also a politically sensitive area. It was affected by the partition of India and Pakistan in 1947 and Bangla Desh situation in 1970-71. These have caused and are still causing large-scale migration of population. The area is also complex in racial and cultural composition which may have an impact on the types of interactions.

Location
The States of Bihar, Orissa and West Bengal (Fig. 2.1) comprise several natural regions of the country, viz., greater part of the Middle Ganga Plain, Lower Ganga Plain, Chota Nagpur plateau, Orissa Highlands, northern portion of East Coastal Plain and a portion of the Eastern Himalayas. It extends from 17°48′ north latitude to 27°31′ north latitude and from 81°24′ east longitude to 89°50′ east longitude. It comprises a total area of 4,17,511 square kilometres with a population of 122,609,995
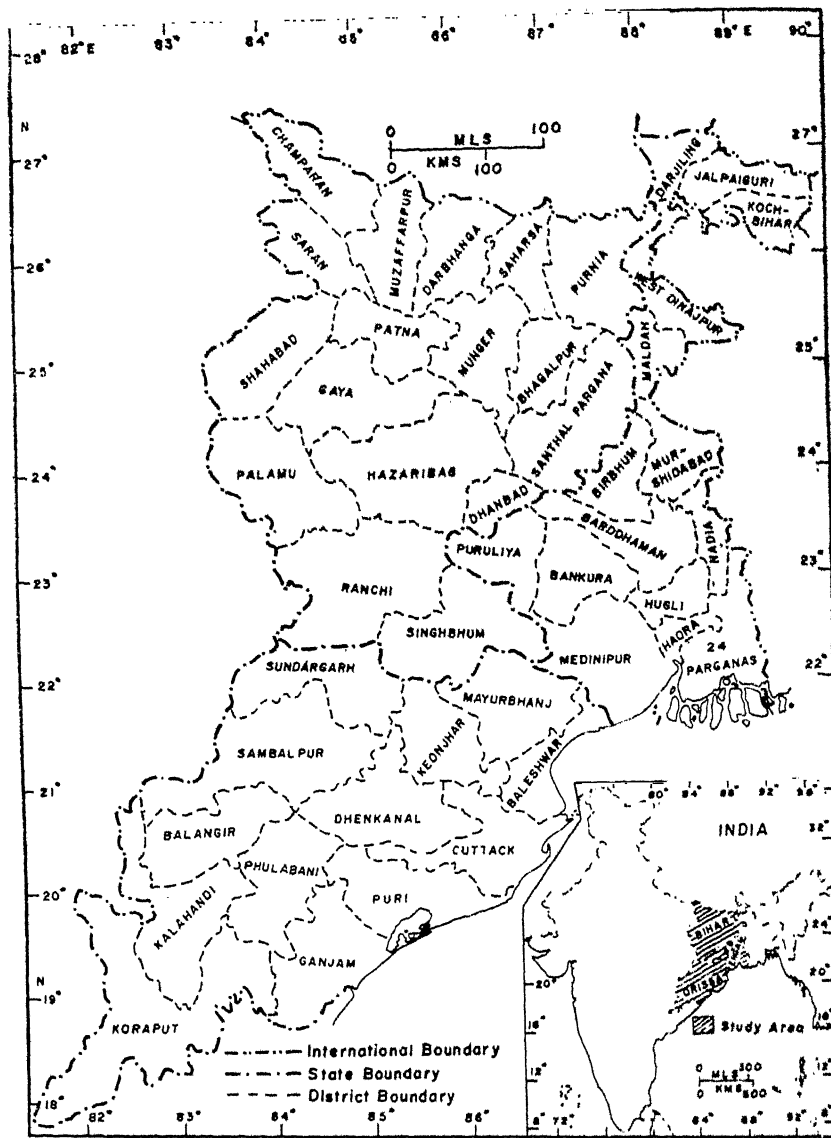
Fig. 2.1 : Bihar, Orissa and W. Bengal—Administrative Units, 1971
Based upon Survey of India map with the permission of the Surveyor General of India
© Government of India copy right 1984
The territorial waters of India extend into the sea to a distance of twelve nautical milies measured from the appropriate base line
Responsibility for the correctness of internal details rests with the publisher

in 1971. In other words, it accounts for 12.73% of the total area of the country and 22.38% of the total population. The region includes the

most industrialized part of the country and is the store house of all important minerals on the one hand, and fertile and agriculturally rich plains on the other. The region comprised forty-six districts in 1971 : seventeen in Bihar, sixteen in West Bengal and thirteen in Orissa (Fig. 2.1).

Natural Endowments

Geology : Geologically the study area can be broadly divided into three categories : (i) the newly folded sedimentary formations ; (ii) the alluvial plain, and (iii) the old crystalline plateau (Fig. 2.2).

Newly Folded Sedimentary Formations : These occur in the extreme north-west and extreme north-eastern portions of the study area in Champaran district of Bihar and in Darjeeling and parts of Jalpaiguri district of West Bengal respectively. In the north-western portion, the Himalayan foothills region of the Siwalik formations are located. They are composed of the slightly folded soft rocks such as clays, sandstones and conglomerates.[1]   It covers an area of about 942.6 sq. km.[2]

The Himalayan formations in the north-eastern portion of the study area, comprise ancient and relatively recent crystalline intrusions and sedimentaries and the Siwalik formation do not exist.

The Alluvial Plains : The plain area consists of a portion of the Middle Ganga Plain (Bihar Plain), Lower Ganga Plain and a portion of the East Coastal Plains (Utkal Plain). It covers about two-fifths of the total area.[3]   The plains are essentially composed of alluvium brought and deposited by the major rivers such as the Ganga and its tributaries in the portion of the Indo-Gangetic Trough and the Mahanadi and its tributaries in the coastal plain of Orissa. The depth of alluvial filling varies widely from one part to another in the Gangetic plains. Its depth increases to 8000 or 10,000 metres towards the Himalayas, while it thins out as a mere veneer on the Peninsular margins, where the remnants of the plateau crop out above the alluvium as steeply inclined ridges composed of the well bedded quartzites.[4]   The alluvium is generally classified in two groups— older alluvium (bhangar) and the newer alluvium (khadar). The older ones occupy higher ground outside the flood plains of the rivers and are coarse and contains gravels. In contrast, the newer alluvium is found in flood plains of the rivers and is composed of silts and clays coupled with fine sands.[5]   The alluvium of the south Ganga plain has been brought from the southern upland and thus, is relatively coarse.[6]

In the Lower Ganga Plain in general and the Delta in particular there is a conspicuous absence of the older alluvium which is quite extensive in the northern part of the region (the Duars).[7]

The Utkal plain essentially consists of recent and tertiary alluvium. However, patches of Archaean gneisses and sandstones, etc., are also found
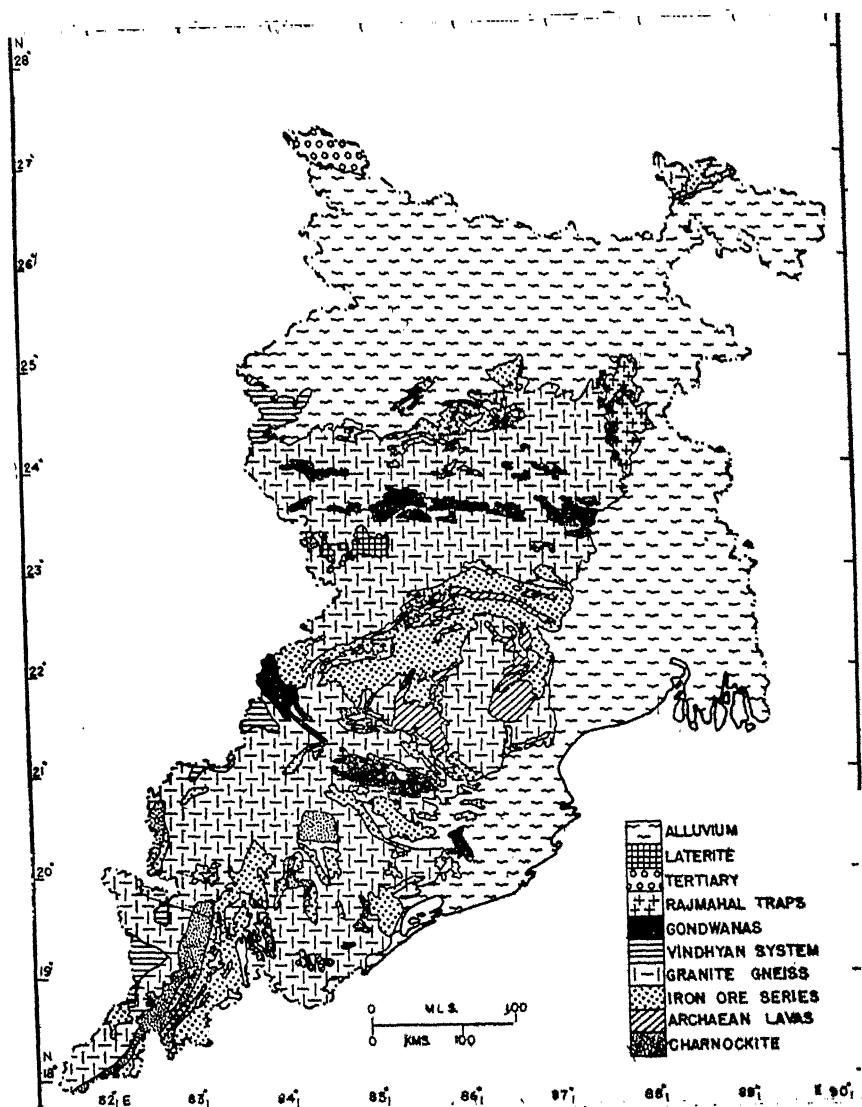
Fig. 2.2 : Bihar, Orissa and W. Bengal—Geology

along the coast.   Pleistocene alluvium occurs at several places along the
coastal tract.   Large deposits of laterite occurs as capping over Khonda-
lite hills, which are of *in situ* origin. The laterite occurring at lower levels is
of detrital origin.   The coastal tracts of Balasore, Cuttack and Puri are
covered with deltaic sediments of the Mahanadi, the Brahmani, the
Baitarni and other rivers. The narrow strip of coastal alluvium in
Ganjam also belongs to this age,[8]

The Ancient Crystalline Plateau : The Ancient Crystalline Plateau includes the Chota Nagpur Plateau of Bihar and the Orissa highlands which together covers about three-fifths of the total area. They are composed mainly of Archaean rocks. They belong to two chief groups : widespread granite and gneiss and sedimentary rocks associated with lavas and intrusive basic igneous rocks. The oldest sedimentary and metamorphosed rocks, known as Dharwars, occur mainly in two areas of Bihar : one extending from Gaya and Hazaribagh towards Mungher (the northern portion of the Chota Nagpur Plateau) ; and the other covering the major part of Singhbhum district and south-eastern fringes of Ranchi district, i.e., the southern Chota Nagpur.[9] These rocks, consisting of quartz-schists, mica-schists, hornblend-schists, etc., penetrated by innumerable intrusions of granite, occupy the dissected rim of Chota Nagpur in, the south. Further south rising towards the Hazaribagh Plateau, occasional beds of mica-schists are found.[10]

The unclassified crystalline rocks which include granite, gneiss and other magmatic rocks with uncertain stratigraphical position dominate in an east and west direction across the core of Chota Nagpur. They are also found in Sambalpur, Bolangir, Paudh Khondmals, Dhenkanal and Ganjam district of Orissa. There is a belt of sediments including crystalline limestone in the granite rocks along the upper Damodar Valley. This belt extends westwards across the Koel in Palamu. The formations of pre-Cambrian group occurs in the south of Brahmani river constituting the Eastern Ghats and the adjoining areas to the north of the same river in Bonai, Keonjhar and Simplipal areas.[11]

The rocks of the Gondwana system, consisting of shales, sandstones, boulder beds and coal measures are found in major river basins of the Chota Nagpur (i.e., Damodar basin) which run in an east-west direction from the Hutar coalfield in the west to the Jharia and Raniganj coalfields in the east. Gridih and a few other coal belts lie outside the main belt. Such rocks are also found in Dhenkanal and Sambalpur districts of Orissa in a narrow and elongated form. The upper Gondwana is represented only in the area of Rajmahal series.[12]

The Vindhyan rocks of Kaimur series are confined to a limited area between Sasaram and the Son river. They comprise sandstones, quartzites, limestones, dolomitic limestones and shales. They lie horizontally and crop out on the steep scarps of the plateau rims.[13]

Physiography : Physiographically the study area can be divided into three units : (i) the northern mountains, (ii) the plain, and (iii) the plateau region (Fig. 2.3).

Northern Mountains and Hills : Newly folded mountains and hills are found in the extreme north-west portion of Champaran district and in the extreme north-east in Darjeeling and parts of Jalpaiguri district.
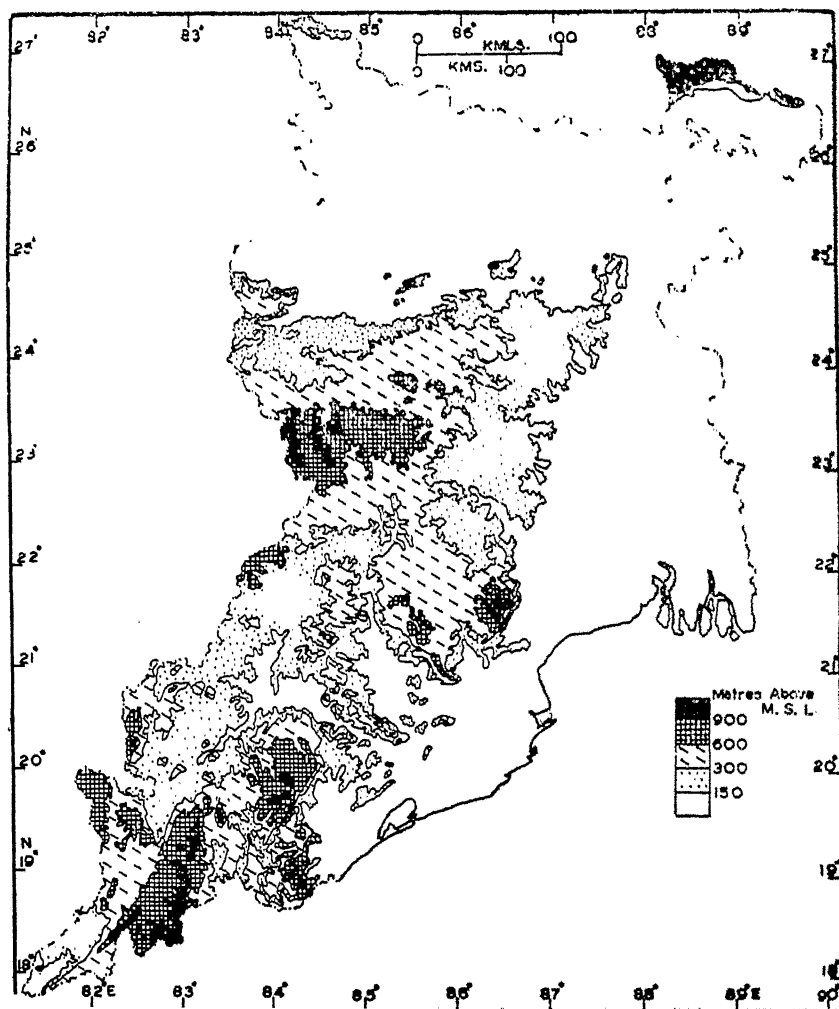
Fig. 2.3 : Bihar, Orissa and W. Bengal—Physiography

Hills of Champaran (Siwalik Range) run in a north-west to south-east direction, parallel to the Nepal border. Their southern end is marked by 150 m. contour line. They consist of two different ranges of hills and intervening valleys. The southern range of low hills, called the Ramnagar Dun, extend for about 32 km. with an average width of 6-8 km. The highest point is 237 m. near Santpur. To the north-east of this range is located the Harsh Valley called Dun. It is about 22 km. long and most of it is less than 150 m. above the sea level. North of this valley lies the Sumeshwar Range. It is 72 km. in length with an average width within Bihar of 5-6 km. Though its average height within the study area is

about 450 metres above sea level, it rises from about 150 metres in the south to 600 metres in the north.[14]

Parts of the Himalayan mountains, which display the most youthful and highly differentiated relief occur in the north-east portion. It consists of ranges of hills and valleys formed in the middle and outer Himalayas, and rises very rapidly from the plains. It is a tangled mass of hilly country, having a rugged topography, steep slopes, knife-edged ridges, very often concave and deep gorges. This region has a maximum elevation of about 4000 metres. It is cut into two parts by the north-south running deep gorge of river Tista which is only 200 to 400 metres above sea level. To the west of the gorge lie the Darjeeling hills which rise to 2600 metres in the Tiger Hill peak.[15] To the east of the gorge the hills rise above 3000 metres.[16] A number of swift flowing perennial rivers and their tributaries, such as the Tista, the Torsa, the Jaldhaka and the Rangit, traverse this region.

The Plains : The plains comprise most of the Middle Ganga Plain, Lower Ganga Plain and Coastal Plains of Orissa (Fig. 2.4). Hemmed in between the foothills of the Siwaliks in the north and Peninsular uplands in the south, Bihar Plain is a featureless plains from one end to the other. The monotony of the relief breaks only when hills as small topographic facets are approached in its southern portion. In general the plain is less than 100 m. above the sea level. It is, however, 150 m. above the sea level in the south incorporating the projections of the southern uplands. In the east, the Kosi Plain ranges between 30 m. in the south to 75 m. in the extreme north. Heterogeneity, if any, in the physical landscape is produced by local eminences such as river levees and bluffs, exbow lakes, tals, chaurs, remnant of river channels, occasional bad-lands and ravines or perceptible notches and slopes carved by the rivers at the outer edge of the bhangar tracts. A more pronounced relief is found in the form of Bhabar plain when the plain meets the hilly area in the north beyond the Tarai. It bears stamps of loosely set gravels and talus slopes over the Tarai, particularly in the extreme north. Its surface is broken by large rivers like the Gandak, the Baghmati and the Kosi, etc., which comb the plain with their affluents in an intricate pattern.[17]

The plain can be subdivided on the basis of the river systems. The Bihar plain can thus be divided into two parts : the North Bihar Plain and the South Bihar Plain. The broad relief features of the North Bihar Plain are a series of alluvial cones formed by master streams along with the intercones. The intercones or intervening slopes between them have lower gradients than the cones. Besides, oxbow lakes are also very common.

The South Bihar Plain is defined by 150 m. contour in the south rather irregularly because of the spurs and scarps of the Peninsular
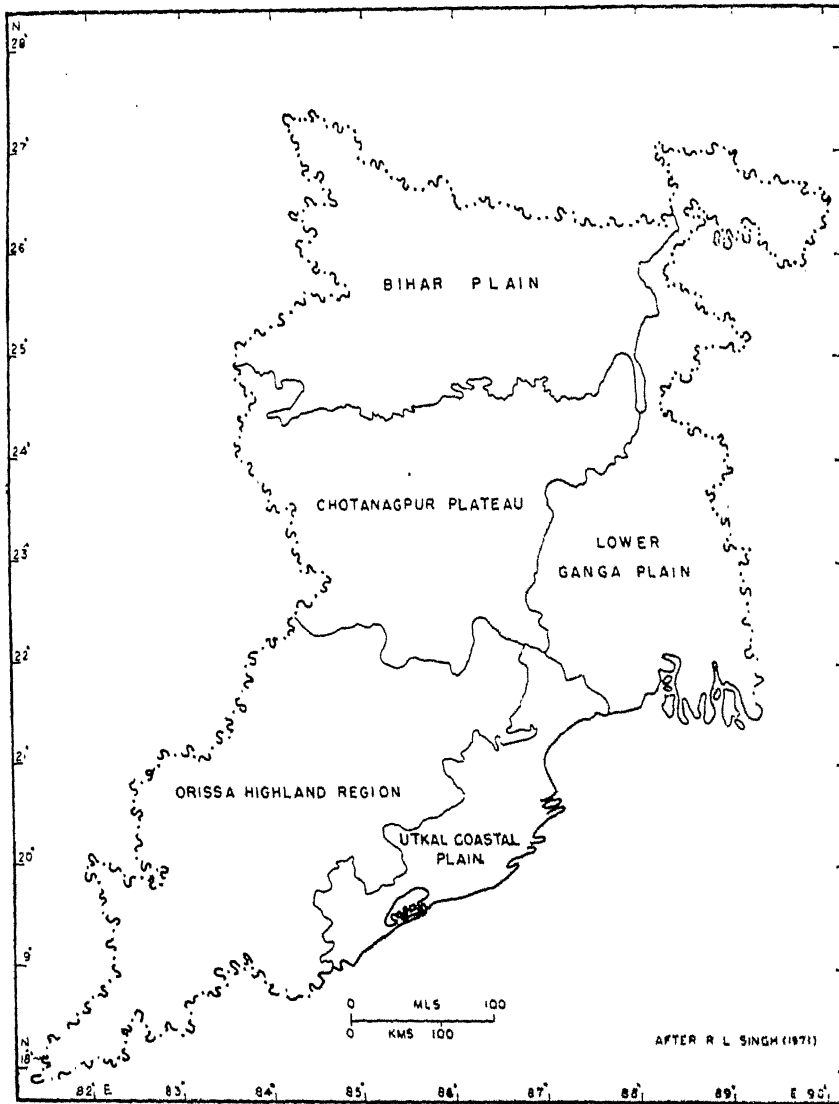
Fig. 2.4 : Bihar, Orissa and W. Bengal—Natural Regions

uplands. It is 100 to 140 kilometres wide in the Son Valley, 40 kilometres opposite Gidhaur hills, widening to 65 km. in south Mungher and Bhagalpur, but tapering hardly to a 3 km. wide ribbon when the Rajmahal hills project themselves against the Ganga to separate it from the Lower Ganga Plain. It lacks oxbow lakes so common in the northern plains. The general surface east of the Son is more or less even and is dotted with residual conical hillocks, sometimes forming elongations up to the bank

of the Ganga, viz., the Barabar Hill, the Rajgir-Jethian Hills (446 m. at Rajgir) and the more significant the Kharagpur hills, running as SW-NE elongated ridge. One rather peculiar feature in Patna district south of the levee of the Ganga is the extension of a low lying area called the Tal. It marks, perhaps, the old bed of the Son.[18]

The monotonous surface of the Lower Ganga Plain is dissected frequently by the tributaries and distributaries of the Ganga. The general slope of this plain is to the south-east. The Delta proper has a gradient of less than 2 cm. per km. while the areas in the immediate vicinity show gradients up to 40 cm. Only a narrow strip along the northern border of the region exhibits a gradient of 100 cm. The micro-order diversities, within the apparently homogeneous plains, bring out the following physiographic subdivisions :

(i)   the Northern Plain comprising two distinct land forms: (a) Duars and (b) the Barind tract ;

(ii) the Delta proper comprising (a) the land of dead and decaying rivers (Moriband delta) in the north (Murshidabad and Nadia), (b) the Active delta of the Sunderbans, and (c) the Mature delta in parts of Birbhum, Burdwan, Midnapore and the entire districts of Hooghly and Howrah ; and

(iii) the Western margin of the delta called the Rarh plain, where the lateritic alluvial landscape along with the coastal scenery at Digha beach has developed.

The Duars (Darjeeling Tarai) is similar to the tarai of the Upper Ganga Plain. It is a zone of seepage where fine sand, silt and clay are deposited by the emerging streams. The Barind tract is a plain of older alluvium between the Kosi-Mahananda corridor in the west and the river Sankosh in the east. Important streams such as the Kosi, the Mahananda and the Tista, etc., make frequent swings in the area. The northern and western fringes, lying in Jalpaiguri and Darjeeling, and Birbhum, Burdwan, Bankura and Midnapore respectively, have areas slightly above 150 m. More than two-thirds of the surface, has an elevation below 30 m. The hills, the swamps and marshes are remarkable components of the physical landscape.[19]

The coastal plain covers about 23,000 sq. km. in the districts of Puri, Cuttack, Balasore and Ganjam. It rises gradually from the Bay of Bengal to merge with the irregular alignment of the Eastern Ghats, where roughly 75 m. contour separates the region from the Peninsular uplands. It is wider in the deltaic region (heart of the region) formed by the Mahanadi, the Brahmani and the Baitarni, and narrows down in between the deltas. The plain has well defined morphological units parallel to the straight shore line. All along the coast there are several sandbars which

all along the coast are found lagoons formed recently due to coastal uplift. The Chilka lake is the largest.[20]

The coast forms a monotonous plain. It is marked by the deltas and lower courses of mature rivers forming broad shallow valleys. The monotony of the topography is broken by the presence of numerous hills, which not only show accordant levels but also appear to be strikingly similar in shape. They have almost pointed summits and rise steeply from an otherwise flat plain.[21]

The Plateau (*Peninsular Upland*) : The Chota Nagpur Plateau and the Orissa highlands (Fig. 2.4) being an ancient landmass, display a variety of landscapes, dominated by an open senile topography. The Chota Nagpur plateau virtually consists of a series of plateaus of varying elevations, hills and hillocks of different altitudes and intermontane valleys of varying width and size. The highest general elevation (about 1,100 m.) is found in the mid-western portion, known as the Pat lands, from where the land descends in all directions in a series of steps particularly towards the east until it merges gradually with the Lower Ganga Plain. The break of the slope is marked by steep scarps where the river courses are interrupted by waterfalls.

The Hazaribagh and Ranchi plateaus stand at the same general elevation (500 m.) but are separated by the Damodar valley. To the west of the Central Ranchi Plateau rise the Pats facing the former with bold steep scarps while to the east the land drops abruptly with similar scarps on the Manbhum Plain. The Baghmundi Highland attaining a height of more than 600 m. at places is separated from the Ranchi Plateau by the Subarnarekha river. To the south-east there is a similar abrupt drop on to the Chaibasa plains, but towards the south it gradually turns into a lower dissected upland characterised by diverse complex topography of the Kolhan and Porhat regions. All the three plateaus—upper, middle and lower appear to be flat, extremely gullied, studded with low rounded hills and bordered by steep escarpments.[22] The Hazaribagh plateau on the northern side of the Damodar trough also has essentially the same features and elevation. It also has two distinct surfaces, the upper Hazaribagh plateau at 600 m. stands engirded by the lower Kodarma plateau (300 m.), which is bordered by steep scarps in the north but slopes gradually to the east. Westward in Palamu, this plateu exhibits highly broken relief similar to the southern dissected portion of the Ranchi Plateau. On the north eastern side the plateau continues into the Rajmahal highlands comprising a chain of level lava plateaus, sculptured hills interrupted with valleys and undulating divided surface.[23] The volcanic Rajmahal hills extend north-south rising 300-450 m. above the general plateau surface overlooking the Ganga in the north with steep scarps to the west. The

variety of topography characterized by sandstone hills and undulating plateau platforms at various elevations.

The rivers draining the Chota Nagpur are characterised by wide shallow channels over the flat plateaus but exhibit youthful features also marked by steep sided narrow valleys and the courses are interrupted by rapids and waterfalls.

North of the broken country of Palamu, the configuration abruptly changes from dome-shaped hills and rolling lands to flat topped plateaus of the Vindhyan System. Horizontal beds of sandstone and limestone form the plateau country of south Shahabad (Rohtas) and the bordering tract of Palamu. They have steep scarps at their edge overlooking the Son Valley and the Shahabad plain.

The Orissa highland is a region of complex denuded hills, plateaus, sharp ridges and mature valleys. The Mahanadi flowing west to east, cuts it into two parts. The northern part is an extension of the Chota Nagpur Plateau and the southern part is covered by hill ranges known as the Eastern Ghats. Physically the region may be divided into three distinct units : (i) the northern uplands ; (ii) the erosional plain and river basins of the central tableland ; and (iii) the south-western hilly region of the Eastern Ghats.

The northern uplands, covering Mayurbhanj, Keonjhar and Sundergarh districts and parts of Dhenkanal are undulating, frequently intersected by hill ranges, with a general slope from north to south. The Brahmani and the Baitarni dissect it into three blocks. The eastern block consists of the heavily forested hills of the Mayurbhanj. The middle block is again a well forested hilly region which occupies most of the Keonjhar district and parts of Dhenkanal and Sundergarh. The south-western block is flat topped and steep edged with dense forest cover. The average elevation of the central section of the upland is 900 m., forming the most important watershed of the Baitarni and the Brahmani.

The erosional plains and the river basins lie between the northern uplands and the south-western hilly region of the Eastern ghats. This tract covers about 28 per cent of the total area of the State of Orissa in the districts of Bolangir, Sambalpur and Dhenkanal. It has a number of erosional plains and river basins. The most important is the Mahanadi-Tel basin covering two-thirds of Sambalpur and one-third of Kalahandi. The region also has three river valleys formed by the Baitarni, the Brahmani and the Mahanadi—all located in the central and western parts of the northern plateau. It also contains a peneplain in the district of Koraput, drained by the Indravati river system. The middle part of the Mahanadi valley and the lower Tel basin are quite extensive. The valley tract is demarcated by 150 m. contour.

The Eastern ghats lie to the south and south-west of the Mahanadi valley region. They rise abruptly and steeply in the east and slope gently to a dissected plateau in the west. They cover the district of Koraput, Kalahandi and part of Ganjam. There are some scattered hills and high plateaus in Bolangir district also. Most parts of this region have an elevation of over 900 m., acting as the watershed between the two sets of rivers, one flowing directly to the Bay of Bengal, e.g., Rushikulya, Nagawati and Vansdhara and the other feeding the Godawari and the Mahanadi systems. This region comprises wide open plateaus fringed by forested hills with highest peaks in the State.

Climate

The area under study experiences a tropical monsoon climate having seasonal rhythm. The year can be divided into three distinct seasons :[24]

(i) The Summer Season from March to May ;

(ii) The Rainy Season from June to October, and

(iii) The Winter Season from November to February.

Summer Season : The temperature rises steadily from February to May. The temperature increases from east to west and north to south in the Bihar Plains and is typically between 30°C and 32°C. It is lower in the northern foothill zone (27°C) and in southern coastal tract (30°C). The temperature is higher near the plateau edge, but the hills and uplands of the Chota Nagpur plateau and Orissa Highlands are cooler. The temperature ranges between 29° to 32°C in the former and 24°C to 31°C in the latter. On account of great elevations the lowest temperature (8.3°C) is recorded in the Himalayan tract.[25] In the coastal tract of Orissa May temperature increases from the Coast (Puri 31°C) to the interior (Cuttack 40°C). The absolute May temperature sometimes even goes up to 46°C or more particularly in the south-western portion of the Bihar Plain. The maximum in the Lower Ganga Plain is less and decreases in the Duars and the coastal areas (40°C).[26]

In general, the typical summer months (April and May) are characterised by hot sun over the long day with hot westerly winds (*loo*) after the morning hours and occasional afternoon duststorms or thunderstorms which bring down the temperature and give some relief. Although these storms are the chief source of premonsoon rain, they also bring hailstorms. The hot westerly winds are less oppressive and the duststorm more rain-giving in the Lower Ganga Plains. The higher humidity, lower temperature and relative absence of dust in West Bengal lead to abrupt discontinuance of the *loo* winds east of Bihar.[27]

The Rainy Season : The arrival of the monsoon varies from the 5th June at Calcutta to 15th June at Patna. However, it may start a

week earlier or be delayed by a week or more. The temperature starts decreasing with the onset of the monsoon. The mean June temperature at Patna (32.9°C) drops to 29.7°C in July and 29.2°C in August. In Orissa Highlands temperature decreases from 24°C in April-May to 20°C in July. The maximum temperature generally rises in September owing to cessation of rains. The monsoon gradually retreats from the region by October.

The season accounts for 80 to 90 per cent of the annual rainfall. July and August are the wettest months. The prevalent wind is easterly to south-easterly.

Winter Season : By November the winter season sets in with appreciable fall in both temperature and relative humidity, and the humid easterly winds are replaced by dry north-westerly or westerly winds. The mean temperature in October is 27.4°C at Patna which decreases to 22.5°C and 18.3°C in November and December respectively. January is the coldest month. In contrast to the summer season the normal January temperature increases from west to east in the Bihar Plains, north to south in the Lower Ganga Plains and from inland to the coastal areas in Orissa. It varies between 16°C and 17°C in the Lower Ganga Plain and is around 21°C in the coastal tract. The Chota Nagpur Plateau has a temperature of around 17°C but in Orissa Highlands it is 19°C in the lower reaches and 13.5°C on the higher elevations. In the Himalayan tract of Darjeeling it is below freezing point on the higher elevations but about 1.7°C on the lower ones with 10°C on the peidmont plateau in Jalpaiguri.

Generally, the winter is bright and sunny but it is occasionally disturbed by cold waves and relatively more cloudy but light rainy weather. The minimum temperature falls as low as 4.5°C during the cold waves. However, the frequency and influence of such cold spells decreases towards the east and south.

Annual Rainfall : The annual rainfall varies from 100 cm. to 400 cm. It decreases from east to west and north to south in the Bihar Plain ; from south to north and east to west in Chota Nagpur ; from north to south in Orissa Highlands ; and from the shore to the inland in the Utkal Coastal region. In West Bengal, however, it is higher both towards the north and in the coastal region. The least annual rainfall occurs in the central portion and the western margin bordering the Chota Nagpur Highlands (Asansol 139.22 cm.).

Rainfall ranges between 100 cm. and 150 cm. in Bihar Plain, but rises to 200 cm. in the north-east. In West Bengal rainfall is higher in the north (350 cm.) and the coast (200 cm.), but is generally around 150 cm. in the central parts. The annual rainfall in Chota Nagpur ranges between 100 cm. and 150 cm. Significantly local variations occur according to

the topographic features : the higher localities having comparatively greater amount of rain.

In the Orissa Highlands rainfall varies from 125 cm. to 165 cm. Sundergarh, Mayurbhanj and Keonjhar districts lying to the north receive the maximum rainfall while Ganjam records the lowest. In the Utkal Coastal Plains, annual rainfall decreases from around 150 cm. on the shore to 70-80 cm. in the interior.

What the region suffers most from is not the lack of adequate amount of rainfall but its faulty distribution, both in space and time. About 77 to 90 per cent of the total annual rainfall is concentrated in the rainy season, particularly in the 45 to 60 rainy days. It sometimes reaches the point of abnormality of 30 cm. or more rainfall in 24 hours. Consequently most of it drains off without benefiting the soils, rather leading to the problem of soil erosion. Rainfall, however, is more evenly distributed in the Bengal Plain. The period of rainfall and its amount vary considerably, causing a drought if the monsoon is delayed,[28] and when the crops are half-parched the immediate rainfall may be sudden and heavy enough to affect the remaining crops through floods. Thus, droughts, particularly in the western portion and floods throughout the plain areas affect the economic vitality of the region. According to a study of 76 years (1875—1950) two to three favourable years is alternated by one or two unfavourable years in course of a four or five years cycle.[29]

Soil
The study area has six types of soils :

    (i) The Alluvial ;
    (ii) Laterites ;
    (iii) Red Soil ;
    (iv) Tarai Soil ;
    (v) Coastal Soil ; and
    (vi) Black Soil.

The alluvial soils are by far the most important. They cover most of the plain areas and the river basins. The alluvials show minor variation in colour, texture, porosity and moisture content. They differ in texture and consistency from drift sands through rich loams and fine silts to stiff and heavy clay. The soils are rich in mineral and organic plant foods but deficient in nitrogen.

The alluvium are of two types—newer (khadar) and older (bhangar) ones. The former covers the flood plains of the rivers including their lower reaches. They are replenished annually by new deposits which mars the proper development of profiles. Naturally they remain moist

and derive moisture from the rivers through seepage in dry periods and are capable of growing crops without irrigation. They mostly consist of fine silts but may be sandy in places as along the Gandak or the Son. Because of better drainage the newer alluvial soils contain low percentage of humus and nitrogen and little lime. Being more sandy or silty, they are highly friable and suitable for the Bhadai, rabi and garma (especially root) crops and such annuals as sugarcane.

The older alluvium or the bhangar covers the upland tracts beyond the annual flood limits of the rivers. Unlike the khadar it is under the process of denudation. An impervious clay layer is found in the subsoil which is important for the construction of wells so essential in these tracts for irrigation. The bhangar soils grade from sandy to clayey loam, but are often heavier with higher clay in depressions. They are richer in lime content than the Khadar and more suitable for rice cultivation.

The calcarious soil (Bhat) of the central-western North Bihar Plains in the lower Gandak valley is a chemical variant of the alluvial soil. It is white in colour, riverine and low lying, but well drained, good for tilth and highly fertile. It contains as high as 25 to 30 per cent of lime, a particular asset for growing sugarcane. The organic matter and nitrogenous content decreases rapidly with depth.

The narrow alluvial strip along the lateritic and red soils in parts of the districts of Murshidabad, Bankura, Burdwan, Hooghly and Midnapore is different from the Ganga alluvium which covers parts of North Bengal Plain and whole of the remaining West Bengal Delta excluding the coastal strip in 24-Parganas and Midnapore. In the former, the riverine tract of the Damodar and the Kosi have alternating sand beds and immature and irregular stratification and hence ill-developed profiles. The soils are relatively poor in plant nutrients and organic matter. Relatively mature profile and higher leaching have affected the uplands of the tract, leading thereby to acidity and deficiency of organic matter.

The rich deltaic alluvial soil is found in the eastern part of Ganjam district associated with the coastal region. The southern most part has sandy loam, while rest of the zone has stiff clay.

In Orissa the alluvial soils are mostly found in river valleys, deltaic tracts and along the coastal area. Their composition and texture vary with the geological nature of the catchment area. These soils are of two types—coastal alluvium and riverine alluvium. The degree of fertility decreases gradually away from the river. The soils are generally rich in lime but poor in nitrogen and phosphoric acid.

Tarai Soil : Another variant of the alluvial soil is the Tarai soil, found in the narrow tarai zones of Champaran district in North Bihar and Jalpaiguri and Siliguri Tahsils of West Bengal (Duars) at the foot of the

Darjeeling Himalayas. Owing to high rainfall (over 120 cm.) and almost continuous seepage of water from the Bhabar zone and highly riverine nature of the tract, these soils have developed under constantly moist conditions. They are highly leached heavy clayey soils, deficient in plant food and organic matter and acidic in character.

Coastal Soil : The coastal soils are the outcome of the interaction of rivers and tides. Such soils have developed in 24-Parganas and Midnapore districts. They are saline and alkaline. They contain deposit rich in calcium (Ca), magnesium (Mg) and half decomposed organic matter.

Laterites : The lateritic soils are found in the undulating, well drained tract along the Chota Nagpur highlands covering the western part of the Lower Ganga Plains ; over the Pats in the south-western portion of the Chota Nagpur ; in major part of the Orissa Highlands and a portion of the Coastal plain. A long narrow belt of lateritic soil extends from Ganjam-Khondmals district boundary to the north-eastern corner of the Orissa Highlands covering about 30 per cent of the elongated eastern area of Dhenkanal and very small eastern patch of Keonjhar district varying in width from 35 to 100 km. Another tract of considerable area is found in the western part of Bolangir and Sambalpur districts. About 50 per cent of the area of Bolangir and 15% of Sambalpur are covered with this soil. Thus, a considerable portion of the south-western hilly region has lateritic soil cover. They are acidic in character and poor in plant nutrients chiefly phosphate and potash and organic matter but rich in nitrogen.[30] They are poorly aggregated and possess low water-holding capacity, and hence are not good for agriculture. Usually sal forests thrive in this soil. The laterite found in the northern part of Balasore (with a width varying from 50 to 100 km.) is formed by the decomposition of gneiss. Naturally, the most important components are iron, alumina and silicic acid derived from the parent rock.

Red Soil : Red soil is found on the eastern margins of the Rarh Plain and the Barind tract of Malda and West Dinajpur districts of West Bengal ; most of the Chota Nagpur Plateau ; the central tableland comprising the Mahanadi-Tel basin as well as in the whole of the northern region from Sundergarh to Mayurbhanj in Orissa. This soil is the characteristic feature of the granite and gneiss surface. It is poor in nitrogen, phosphoric acid, humus and lime but rich in potash and iron content. The uplands have poor, light coloured and thin soils, while the valleys have more fertile, fine, dark and deep soils. It is generally thin, sandy or gravelly on the uplands but thick and loamy in the valleys and depressions. This soil is good for plant life and produces good crops in areas where it is not shallow. It responds well to irrigation giving yields which are second only to the alluvial soils.[31] The red soil found in West Bengal is transported laterites deposited on the eastern flank of the lateritic stretch. It is

shallow and coarse textured and is poor in organic matter and plant nutrients with acidic character. It has been brought under cultivation after deforestation, which has accelerated the process of erosion.

Black Soil : It is found in patches in the central belt on either side of the Mahanadi, consisting of parts of Dhenkanal and Bolangir district and in a patch near Chilka Lake. It is also found over the lava surface of the Rajmahal highlands. It is found in depressions or in plains without notable relief and contains high proportion of fine elements and shrinks considerably in dry season. It originates either from decomposition of basic basalt or certain sedimentary clays or decomposition of calcium and magnesium. Scanty rainfall plays a part in its formation. It is rich in potassium and magnesium but poor in nitrogen and phosphorus. It is not as thick as in the Deccan Trap. It is less moisture-retentive but more friable and suited to irrigation. It is suitable for growing rabi crops like pulses and wheat. Cotton is generally grown on such soils.

Natural Vegetation (Forest Resources)

The climate of the region is suitable for forest as natural vegetation and not grasses. However, the forest cover is now limited only to the hills and uplands which are not suitable for cultivation. It is well exemplified by the Table 2.1 and Fig. 2.5 which is based on the location coefficient of the percentage of total area of each district under forest. The districts have been classified with the help of median, quartiles and octiles. Forests have been cut and land brought under cultivation in most part of the plains, river basins and even flat plateaus. Forests have also disappeared from the portions of the hills and uplands where jhum cultivation is practised, viz., in portions of Ganjam and Baudh Khondmals. Consequently the forests are found only in the northern part of Champaran, the Himalayan tract and the Duars of Darjeeling and Jalpaiguri, western region of Midnapore, Bankura, Burdwan, and Birbhum in West Bengal ; a large portion of Chota Nagpur Plateau and Orissa Highlands apart from the coastal tract.

The forests of the study areas can be grouped under the following classes :

   (i) Mountain Forest ;
   (ii) Tropical evergreen forest ;
   (iii) Moist deciduous forests ;
   (iv) Dry deciduous forests ; and
   (v) Littoral forest.

Mountain forest is found in the Himalayan tract of Darjeeling and parts of Jalpaiguri where they are related to altitude. Below 1000 metres there are tropical evergreen forests. Between 1000 and 1500 metres subtropical forest is found which comprises Terminalia, Cedrela, Michela and

various laurels. Bamboos are also found in this belt. Temperate forest occur between 1500 to 3000 metres above sea level. They contain some varieties of oak and conifers. Mangolia Champbelli and large rhododendrons trees are also found in the belt. Much of the forest area has been cleared for tea gardens around Darjeeling and Kurseong. Beech and birch are also found in many areas. Conifers are found at slightly
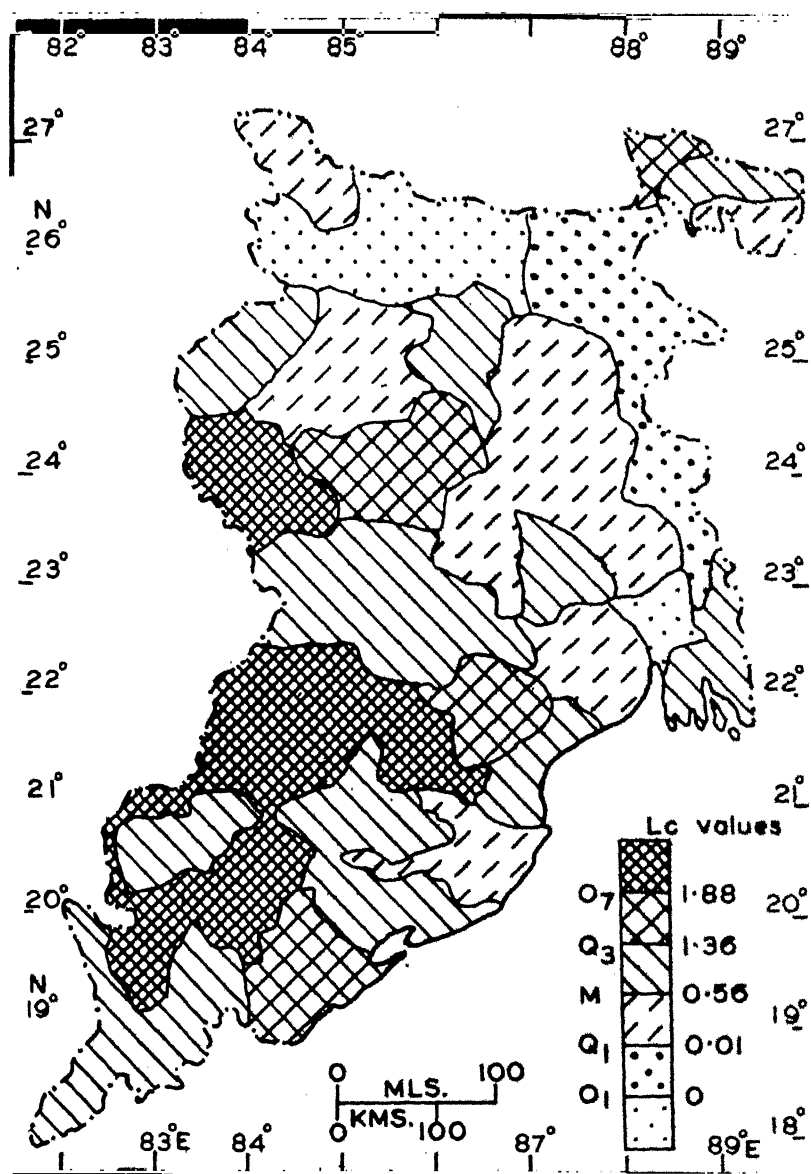
Fig. 2.5 : Bihar. Orissa, & W. Bengal—Concentration of Forested Area, 1971

higher elevation. There are also dense forest of deodars. Due to the occurrence of mist on the southern slopes, the trees are covered with mosses and orchids. Many kinds of sweet temperate barriers are also found in the undergrowth. Above 3000 metres, silver fir is very common.[32]

Tropical evergreen forests are concentrated in Duars of West Bengal and tropical semi-evergreen forest occur in small areas in the districts of Ganjam and Dhenkanal, not far away from the sea-coast.

Moist deciduous forests are found in areas having more than 120 cm. of annual rainfall in the Chota Nagpur plateau and the Orissa Highland apart from the submontane zone of North Bihar Plains and West Bengal in the north. The moist deciduous forest of Chota Nagpur is demarcated by isohyat of 120 cm. starting from the eastern tip of Rajmahal Highlands,

TABLE 2.1 : **Concentration of Forested Area in Eastern India, 1971**

Category	Measure of dispersion	Volume of L_c	Name of Districts
I (Very High)	Above O_7	Above 1.88	Palamu, Baudh, Khondmals, Sundergarh, Sambalpur, Keonjhar and Kalahandi.
II (High)	$Q_3 - O_7$	1.36 — 1.88	Hazaribagh, Darjeeling, 24-Parganas, Ganjam and Mayurbhanj.
III (Medium High)	$M - Q_3$	0.56 — 1.36	Ranchi, Singhbhum, Shahabad, Mongher, Jalpaiguri, Bankura, Puri, Dhenkanal, Bolangir, Koraput and Balasore.
IV (Medium Low)	$Q_1 - M$	0.01 — 0.56	Purulia, Midnapore, Burdwan. Birbhum, Cooch Behar, Gaya, Santal Parganas, Champaran, Dhanbad, Bhagalpur and Patna.
V (Low)	$O_1 - Q_1$	0 — 0.01	Purnea, West, Dinajpur, Malda, Murshidabad and Nadia.
VI (Very low)	Below O_1	Below 0	Saran, Muzaffarpur, Darbhanga, Saharsa, Howrah, Hooghly and Calcutta.

this type of forest is found in scarped face of Chota Nagpur with varying elevations, and in the scattered highlands of Kolhans and Dhanjori. Western higher plateaus and their descending slopes are also clad with thick forest. Thus, moist deciduous forest is found in Ranchi, Palamu and Hazaribagh districts.[33] This type of forest is more extensive in the Orissa Highlands and is found from the southern extremity of the region to the central belt of Mayurbhanj passing irregularly through Ganjam and Dhenkanal. It is also found in haphazard manner throughout Ganjam, Puri and Cuttack. Such forests are also found in a broad belt along the entire length of the northern districts in West Bengal. It is broader towards the east in the Duars.[34] Sal is the main species. Other common trees associated with sal forests are champa and chilauni, khair, gamar and tun in the Himalayan foothill zone, apart of scrubs and a number of grasses and reeds. The predominant trees in Champaran are sal, shisham, tun, khair and semal. Sabai is the predominant grass. In Chota Nagpur important species other than sal are mahua, jamun, kusum, tilai, harin, harra, gular, asan, dhaunta, piar, sidle, khair, amaltas and bamboo.

The Tarai Jungles and Grasses : In the moist or swampy region south of the foothill zone in Champaran and further east wherever Tarai occurs, the typical vegetation consists of bamboos, long coarse sabai grass, narkat reeds, jhau and some forest trees of the Himalayan foothill zone.[35]

Dry Deciduous Forests are found on the fringes of the Hazaribagh Plateau where annual rainfall is below 125 cm., in Kaimur uplands of Shahabad and Palamu, and towards the western portion of Orissa Highlands where the conditions are appreciably dry in the central tract as well as in the northern and western portions of Bolangir and Sambalpur. They comprise a wide variety of stunted deciduous trees like amaltas, semal, harra, khair, palas, mahua, asan, etc., mixed with bamboo and sabai or kus grass. These forests also occur on the western fringe of the Lower Ganga Plain in Midnapore, Bankura, Burdwan and Birbhum. Scattered patches are also found in Howrah and Hooghly districts of the Delta proper.

The Littoral Forest : The littoral forests occur in Sundarbans of West Bengal and in a narrow strip along the sea coasts of Cuttack and Balasore. The former is mangrov and tidal forest. The most common tree found here is sundri. Other trees are goran, gewa, bean and dhundal. A dwarf variety of palm called nipa palm grows widely along the edge of the salt water.[36] Rai is the important tree of Mahanadi mouth. The dense growth of palm and coconut has adapted itself nicely to the severe cyclones from the Bay of Bengal during the pre-and post-monsoon periods. Creepers of various species, and canes and other minor types of trees have led to the description of the tidal forests of the Mahanadi mouth as the 'little Sundarbans'.[37]

Minerals

The Peninsular portion of the study area is very rich in minerals (Fig. 2.6). It contains more than 90 per cent of the total known minerals of the country. Important among them are coal, iron ore, mica manganese, chromite, copper ore, bauxite, limestone and dolomite, fireclay, chinaclay and a number of other minerals such as asbestos, kyanite, stiatite, byrites,
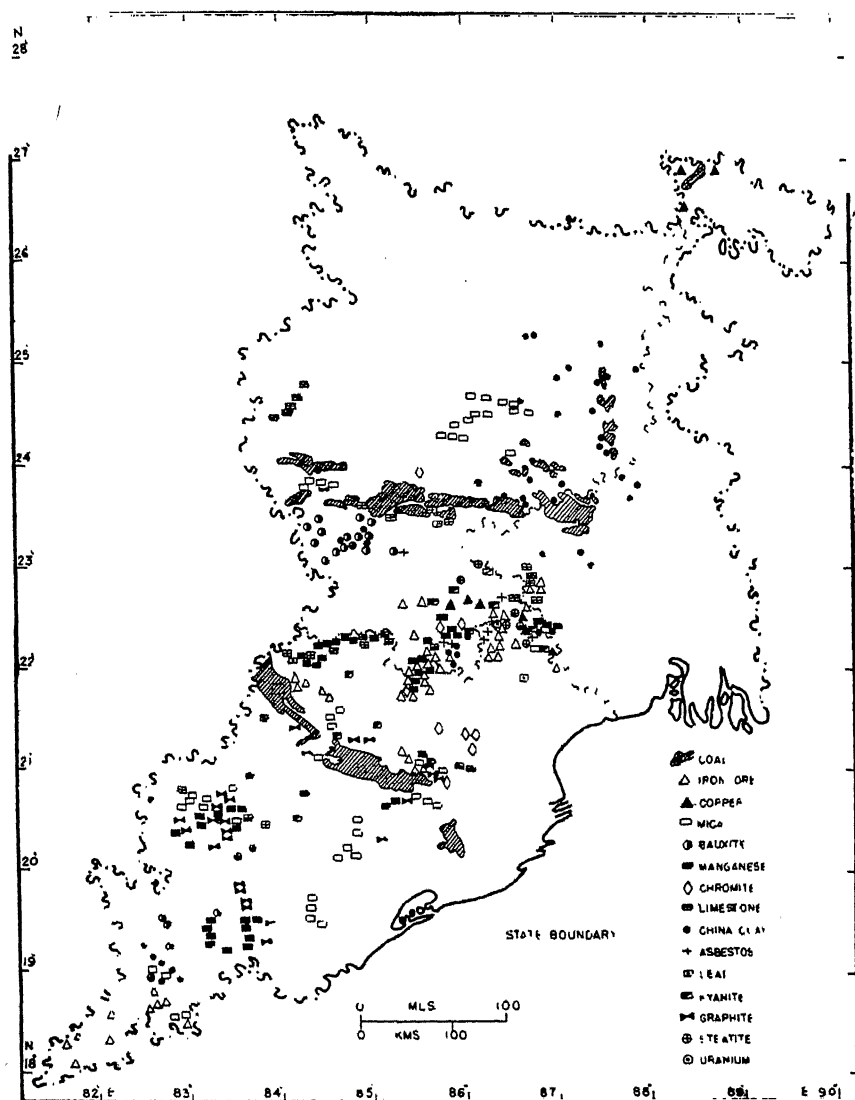
Fig. 2.6 ; Bihar, Orissa & W. Bengal—Minerals

graphite, apatite, lead, zinc, nickel, wolfram, glass sand, etc. These minerals are found in Chota Nagpur, Orissa Highlands and the eastern extension of Chota Nagpur in the Lower Ganga Plain.

Chota Nagpur : Chota Nagpur has the most important mineral belts of India, accounting for 40 to 100 per cent of the national production of several minerals. It holds key position in the production of certain minerals : nearly 100 per cent of copper and apatite, 95 per cent of kyanite, more than 50 per cent coal, mica, bauxite and chinaclay and about 40 per cent of iron ore. It contains 80 per cent of the country's known deposits of coal and nearly 100 per cent of coking coal.[38]

The above mentioned minerals occur in well defined belt. The occurrence of coal coincides with the Gondwana rocks of the Damodar Valley. The principal coalfields extend in an east-west direction, conforming approximately to the alignment of the Auranga and Damodar rivers from the Hutar fields in the west to Jharia fields in the east. There are other fields off this main strike, namely, Daltonganj in the North Koel and the Barakar and Giridih fields in Giridih river basin. A number of small fields also occur on the western edge of the Rajmahal Hills. Most of these fields contain good quality bituminous coal suitable for coke.[39] The estimated and inferred reserves totals 45841 m. tons or approximately 38 per cent of the total coal reserves of the country.[40]

Iron ore is associated with the Iron Ore Series of the Dharwar in the Kolhan area of Singhbhum district. Haematite iron ore found here contains more than 60 per cent iron. Jones has estimated a minimum of 1047 m. tons of iron ore with not less than 60 per cent iron content.[41]

Mica is found in a belt, 128 km. long and 32 km. wide on the northern fringe of the Kodarma Plateau. This belt roughly coincides with the outcrop of Dharwars consisting of schists, gneiss and pegmatites.

Copper Veins occur in a 130 km. long belt in Singhbhum following the line of soda granite outcrop. Starting from Duarpuram near Chakradharpur, it runs through Kharsawan up to Turandih ; then although soda granite outcrops are missing for some distance, the copper belt persists through Rakha mines, Musabani and eventually ends at Bahragora.

Bauxite occurs in the Pat area. The bauxite enrichment in the laterite cappings on the west side of Ranchi district and adjoining highlands in Palamu district constitutes the most important deposit in India. The reserves of high grade bauxite amount to more than 10 m. tons.[42]

Limestone occurs scattered in considerable areas of Palamu, Hazaribagh, Ranchi and Singhbhum districts and feeds various cement factories located nearby.

Besides these, various other minerals like apatite, asbestos, byrites, chromite, kyanite, steatite, uranium, etc., are found in Singhbhum.

Orissa Highlands : The mineral resources of the Orissa Highlands are rich and extensive, the important ones being iron ore, coal, manganese, chromite, dolomite, fireclay chinaclay, graphite, kaoline, kyanite, vanadium, bauxite, copper, lead, asbestos and mica. Most of these minerals occur mainly in the four inland districts of Mayurbhanj, Keonjhar, Sundergarh and Sambalpur.[43]

The main iron ore concentrations are in Keonjhar district, Bonai subdivision of Sundergarh district, Mayurbhanj and Sambalpur districts. The region has about one-third of the country's proved reserves of high grade (55 to 69 per cent) exploitable ore. Keonjhar district with about 100 m. tons of proved reserves is the most important iron ore mining area of the State. Next comes Bonai subdivision of Sundergarh district.

The estimated reserve of coal is about 800 m. tons but the known reserves are only 140 m. tons at Hinger-Rampur (Sambalpur) and 150 m. tons at Talcher (Dhenkanal).

The reserves of manganese are estimated at 20 m. tons most of which exist in Keonjhar (15 m. tons), Sundergarh (5 m. tons) and Bolangir districts.

Chromite occurs mainly in Kaonjhar and Dhenkanal with an estimated reserve of 420,000 tons. Limestone and dolomite are found in Sundergarh and Sambalpur, with estimated reserves of 130 and 250 m. tons respectively. Sundergarh and Sambalpur also contain fireclay. Chinaclay occurs mainly in Keonjhar, Mayurbhanj, Sambalpur and Sundergarh districts. Apart from these the region is credited with other minerals such as asbestos (Mayurbhanj and Sundergarh), bauxite (Bolangir and Sambalpur), Copper (Mayurbhanj and Bolangir) ; lead and zinc (Mayurbhanj), graphite (Bolangir, Sambalpur, Dhenkanal), Kyanite (Dhenkanal, Bonai, Sundergarh and Mayurbhanj) and nickel Dhenkanal and Keonjhar).

The portion known as Dandakaranya in Koraput and Kalahandi districts of Orissa also has mineral resources as the most valuable asset. The important minerals are iron ore, manganese, limestone, glass sand or quartz.

Lower Ganga Plain : Mineral deposits are concurrent with the older formations of Duars in the north and Rahr in the west, the latter being more important. Coal is by far the most important mineral. Raniganj coalfields, lying in this region, are still the second largest in the country. The coal formations are confined to the Gondwanas lying within the districts of Birbhum, Burdwan and Bankura. The estimated reserves of coking coal are 288 m. tons up to 300 m. depth and about 548 m. tons up to 500 m.[44] The non-coking coal of superior quality is estimated at nearly 2759 and 4838 m. tons for the corresponding depths. In addition there is a huge reserve of inferior quality coal in the region.

Iron ore occurs in four series : (1) banded haematite quartzites containing good quality ore in Buxa (the Duars), (2) clay limestone of iron stone shales, (3) lateritic ores of the eastern Raniganj coalfields and (4) magnetic patches of Archaean metamorphic rocks. Prior to the knowledge of the Singhbhum deposits in Bihar, Raniganj iron ores were considered as the main source for large scale smelting plants in the country. But now these lateritic deposits are used mainly for building and road-making purposes.

Other important minerals of importance are copper near Buxa in the Duars, plastic fireclay in Barakar measures, sulphide minerals, wolfram, ilmenite, iron-manganese and mica, etc., scattered in Bankura and Midnapore districts. Dolomite and limestone are found in the Duars. Radioactive minerals occur in Bankura district. Graphite and Sillimanite are found along the border of the Purulia district.

TABLE 2.2 : **Occupational Structure, 1971 and Income by Industrial Origin, 1970-71**

	Occupations	Percentage of total workers engaged	Percentage of total income
1.	Agriculture	73.33	40.75
2.	Livestock, forestry, fishing and plantation, etc.	1.85	10.45
3.	Mining and quarrying	1.16	3.11
4.	Manufacturing :		
	(a) Household industry	2.77	14.41
	(b) Other than Household industry	5.50	
5.	Construction	0.71	1.34
6.	Trade & Commerce	3.21	7.02
7.	Transport & Commerce	2.40	5.13
8.	Other Services	7.45	17.78

Source : Bihar : Selected Plan Statistics, 1976, pp. 106-107 ; West Bengal : Economic Review; 1971-72, p. 68 ; and Orissa : Statistical Abstract, 1973, pp. 325-27.

Economic Base

The occupational structure of the region reveals the nature of economy. It is largely under-developed because about three-fourths of the total

workers (75.18 per cent) are engaged in primary activities, less than 15% (12.64%) in secondary occupation and only about 10% (10.56%) in tertiary activities (Table 2.2) Agriculture alone accounts for a little less than three-fourths of the total working force. Only 8.27 per cent of the total workers are engaged in processing and repair with 5.50 per cent in manufacturing and 2.27 per cent in household industries. Trade and commerce and mining and quarrying employ 3.21 and 1.16 per cent of the total workers respectively. In terms of contribution to the total income (Table 2.2) primary activities are responsible for about one-half of the total income followed by tertiary occupations (19.12 per cent) and manufacturing (14.41 per cent).

Agriculture

It is obvious from Table 2.3 that the economy of the study area is predominantly agricultural. It is only in limited pockets where the proportion of the total workers engaged in agriculture is lower, viz., Calcutta, Howrah, Hooghly, 24-Parganas, Singhbhum, Burdwan, Sundergarh, Darjeeling and Jalpaiguri districts. In these areas also, which

TABLE 2.3 : **Percentage of Total Workers engaged in Agriculture, 1971**

Category	Measure of Dispersion	Percentage of workers engaged in agriculture	Name of District
I (Very High)	Above O_7	Above 87.40	Saran, Champaran, Muzaffarpur, Darbhanga, Purnea and Palamu.
II (High)	$Q_3 - O_7$	84.10—87.40	Saharsa, Santal Parganas, West Dinajpur, Kalahandi, Balasore and Baudh Khondmals.
III (Med. High)	$M - Q_3$	79.71—84.10	Gaya, Shahabad, Mongher, Bhagalpur, Ranchi, Cooch Behar, Bankura, Mi dnapore, Mayurbhanj, Bolangir and Koraput.
IV (Med. Low)	$Q_1 - M$	72.16—79.71	Patna, Hazaribagh, Malda, Murshidabad, Birbhum, Purulia, Sambalpur, Keonjhar, Cuttack and Dhenkanal.
V (Low)	$O_1 - Q_1$	51.97—72.16	Singhbhum, Nadia, Hooghly, Burdwan, Sundergarh, Ganjam, Puri.
VI (Very Low)	Below O_1	Below 51.97	Howrah, 24-Parganas, Darjeeling, Jalpaiguri, Dhanbad & Calcutta.

are industrially and commercially developed, about one-half of the total workers are engaged in cultivation (Table 2.3 and Fig. 2.7). The plain areas particularly north-west portion of the North Bihar plain, is dependent almost entirely on agriculture, where more than 85 per cent of the total workers are engaged in cultivation. It includes the districts of Saran, Champaran, Muzaffarpur, Darbhanga and Purnea, which are above octile seven.
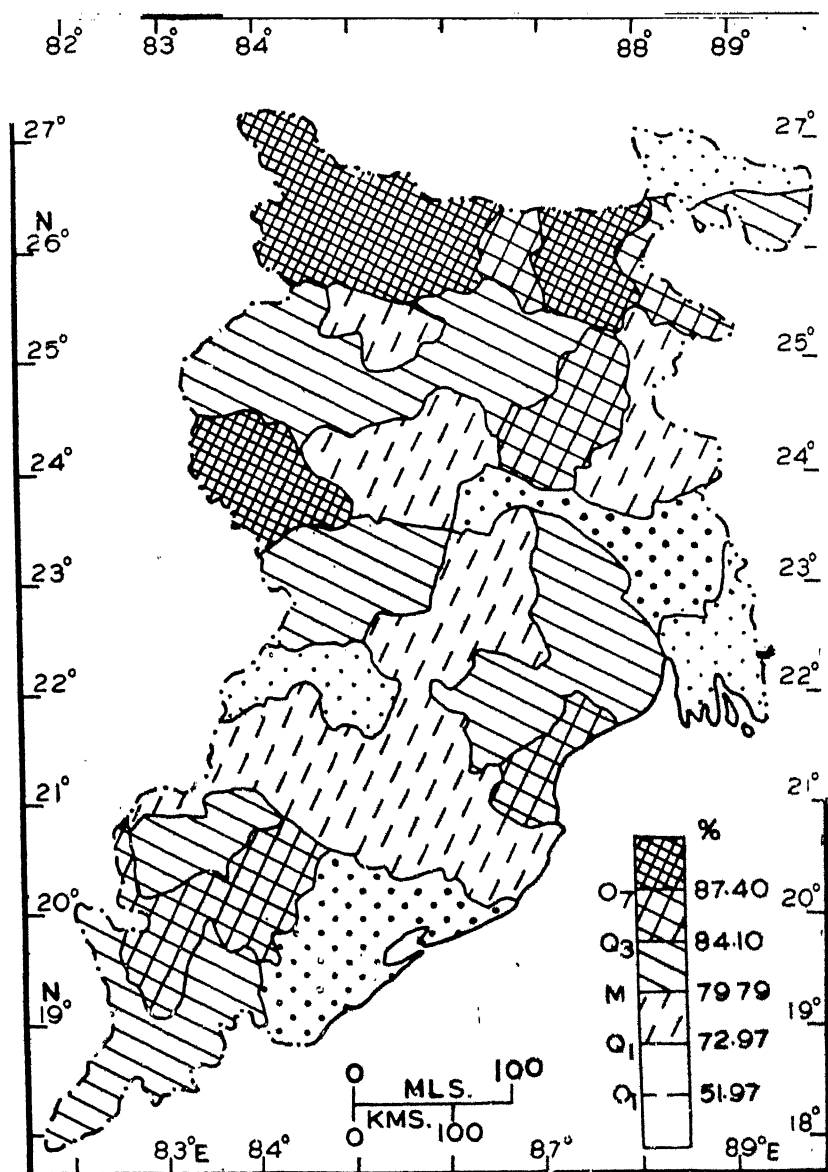
Fig. 2.7 : Bihar, Orissa, & W. Bengal—Share of Total Workers Engaged in Agriculture, 1971

Despite the importance of agriculture in the economy of the area there are marked variations in the availability of agricultural land (cultivable area). It varies from 21 per cent of the total area in Baudh Khondmals of Orissa to 90 per cent in Cooch Behar and West Dinajpur of West Bengal. Table 2.4 and Fig. 2.8 show the concentration of cultivable area in different districts of the study area.

TABLE 2.4 : **Concentration of Cultivable Area, 1971**

Category	Measure of dispersion	L_c Value of cultivable area	Name of Districts
I (Very high)	Above O_7	Above 1.37	W. Dinajpur, Malda, Murshidabad, Cooch Behar, Nadia & Birbhum.
II (High)	Q_3-O_7	1.29—1.37	Saran, Patna, Muzaffarpur Saharsa, Darbhanga, Purnea, Hooghly and Midnapore.
III (Med. High)	$M-Q_3$	1.12—1.29	Burdwan, Howrah, Bankura, Purulia, Balasore, Cuttack, Champaran, Shahabad and Santal Parganas.
IV (Medium Low)	Q_1-M	0.82—1.12	Bhagalpur, Mongher, Hazaribagh, Gaya, Palamu, Dhanbad, Singhbhum, Bolangir, Puri, 24-Parganas and Jalpaiguri.
V (Low)	O_1-Q_1	0.69—0.82	Sambalpur, Dhenkanal, Mayurbhanj, Keonjhar, Koraput and Ganjam.
VI (Very Low)	Below O_1	Below 0.69	Kalahandi, Sundergarh, Baudh Khondmals, Ranchi and ·Calcutta.

It is higher in West Bengal Plain, Bihar Plain and Orissa Coastal Plain (above 83 per cent) in the east Central portion of West Bengal followed by North Bihar Plain, north-western portion of South Bihar Plain and south-western portion of West Bengal Plain (in Hooghly and Midnapur districts). The share of cultivable land to total land is low in the Chota Nagpur Plateau, Orissa Highlands as well as in the Sumeshwar Range in New Champaran and the Darjeeling Hills.

Net sown area as percentage to total cultivable area indicates the quality of agricultural land. It is generally higher in the plain areas. The
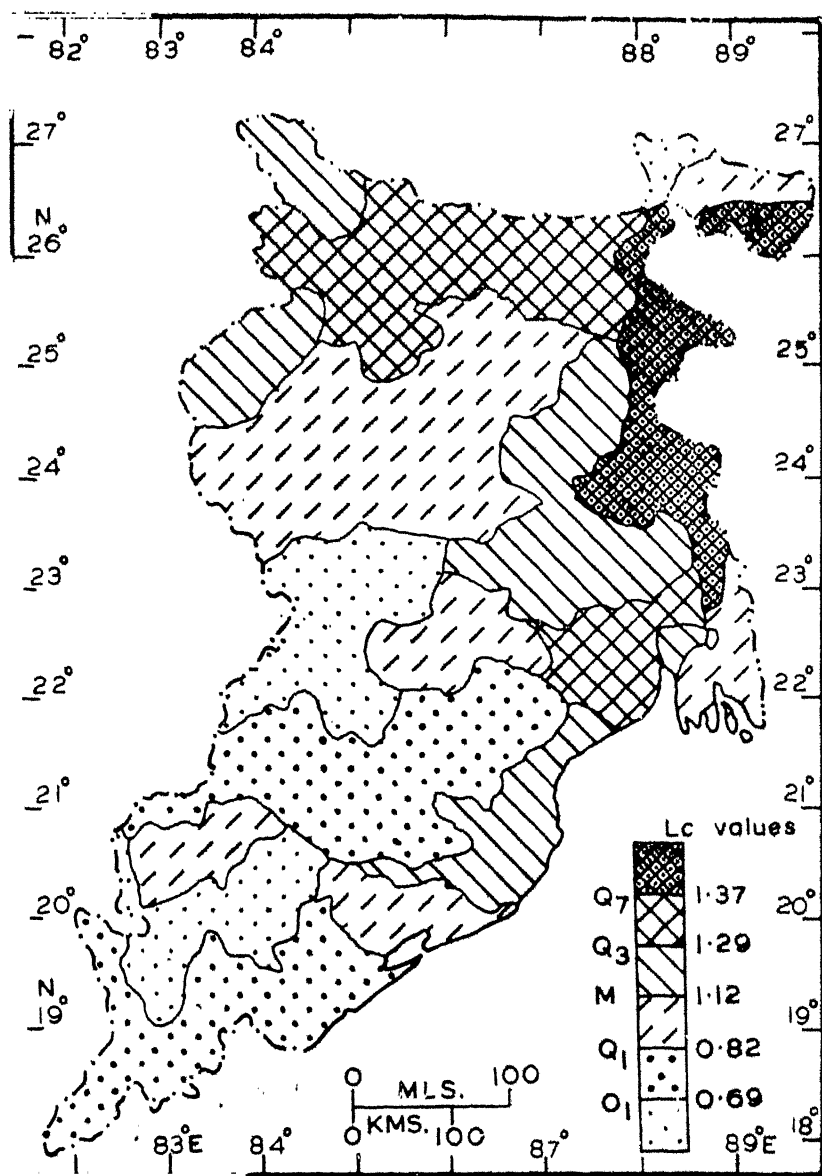
Fig. 2.8 : Bihar, Orissa & W. Bengal—Concentration of Cultivable Area, 1971

Majority of the net sown area is found in the plain areas (Table 2.5 and Fig. 2.9). It is highest in central and northern portion of West Bengal Plain and northern portion of Orissa coastal plain. This zone is followed by other plain districts of West Bengal and north-central portion of Bihar plain. Other plain districts also have an L_c value of more than one (Table 2.6, Fig. 2.10). Mongher is the only exception. The areas with the lowest L_c values belong to Chota Nagpur Plateau, Orissa Highlands and Darjeeling Hills. However, there are some variation in the general pattern of net sown area expressed as percentage of cultivable land. Some of the areas located in the Plateau and highlands have a high percentage of net sown area to cultivable land and vice-versa. The examples of Baudh Khondmals and Mayurbhanj of Orissa on the one hand and Mongher, Bhagalpur, Saharsa, Purnea districts of Bihar and Bankura and Midnapore ·

TABLE 2.5 : **Net Sown Area as Percentage to Total Cultivable Area, 1971**

Category	Measure of Dispersion	Percentage of Net sown area	Name of Districts
I (Very High)	Above O_7	Above 95	W. Dinajpur, Nadia, Hooghly, Birbhum and Balasore.
II (High)	Q_3—O_7	92—95	Patna, Shahabad, Cooch Behar, Malda and Burdwan.
III (Med. High)	M—Q_3	83.5—92	Champaran, Gaya, Muzaffarpur, Darbhanga, Saran, Murshidabad, Jalpaiguri, 24-Parganas, Howrah, Baudh Khondmals, Cuttack, Mayurbhanj and Bolangir.
IV (Medium Low)	Q_1—M	75—83.5	Sambalpur, Puri, Ganjam, Dhenkanal, Kalahandi, Purnea, Bhagalpur, Saharsa, Darjeeling, Midnapore and Bankura.
V (Low)	O_1—Q_1	58—75	Sundergarh, Keonjhar, Koraput, Mongher Hazaribagh and Purulia.
VI (Very low)	Below O_1	Below 58	Santal Parganas, Singhbhum, Ranchi, Dhanbad and Palamu, Calcutta (nil).
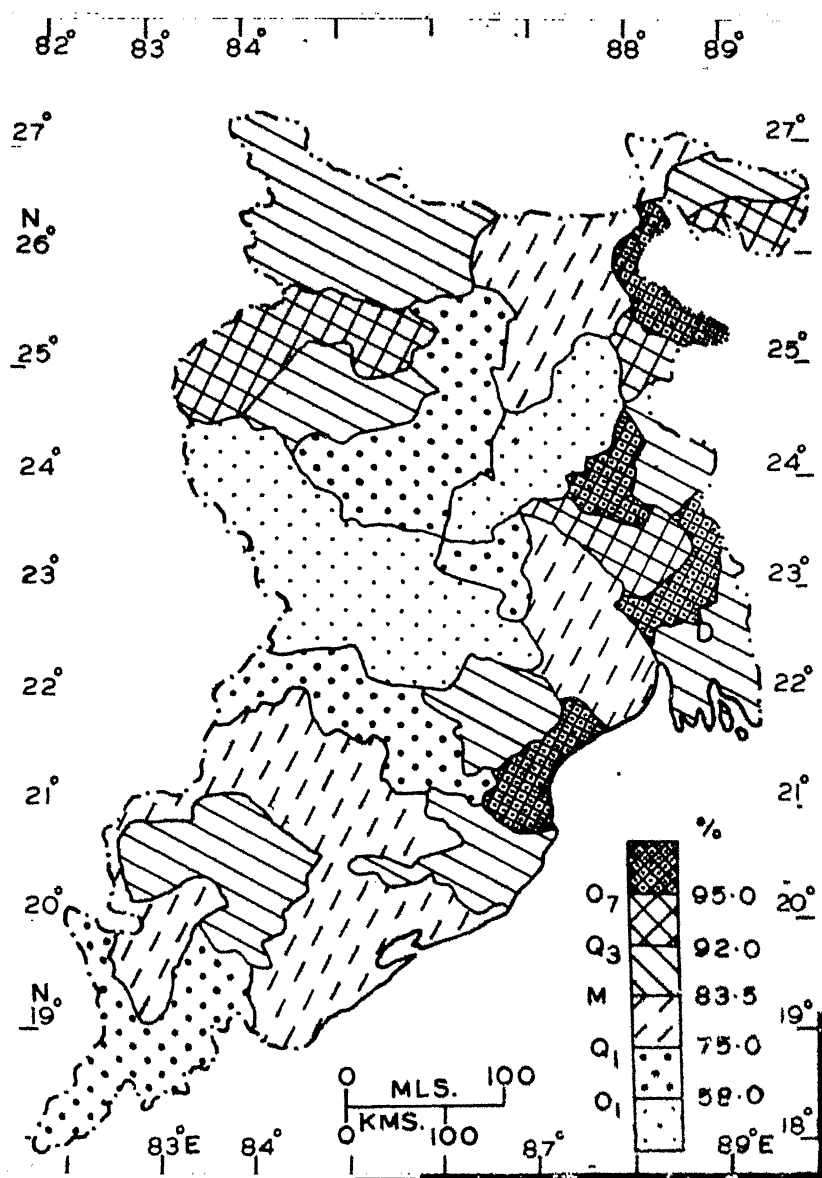
Fig. 2.9 : Bihar, Orissa, & W. Bengal—Net Area Shown as Percentage to Total
        Cultivable Area, 1971

districts of West Bengal on the other may be cited. The lower proportion of net sown area to cultivable land indicates a higher proportion of culturable waste, current fallow and other fallow lands indicating the potential for further agricultural development.
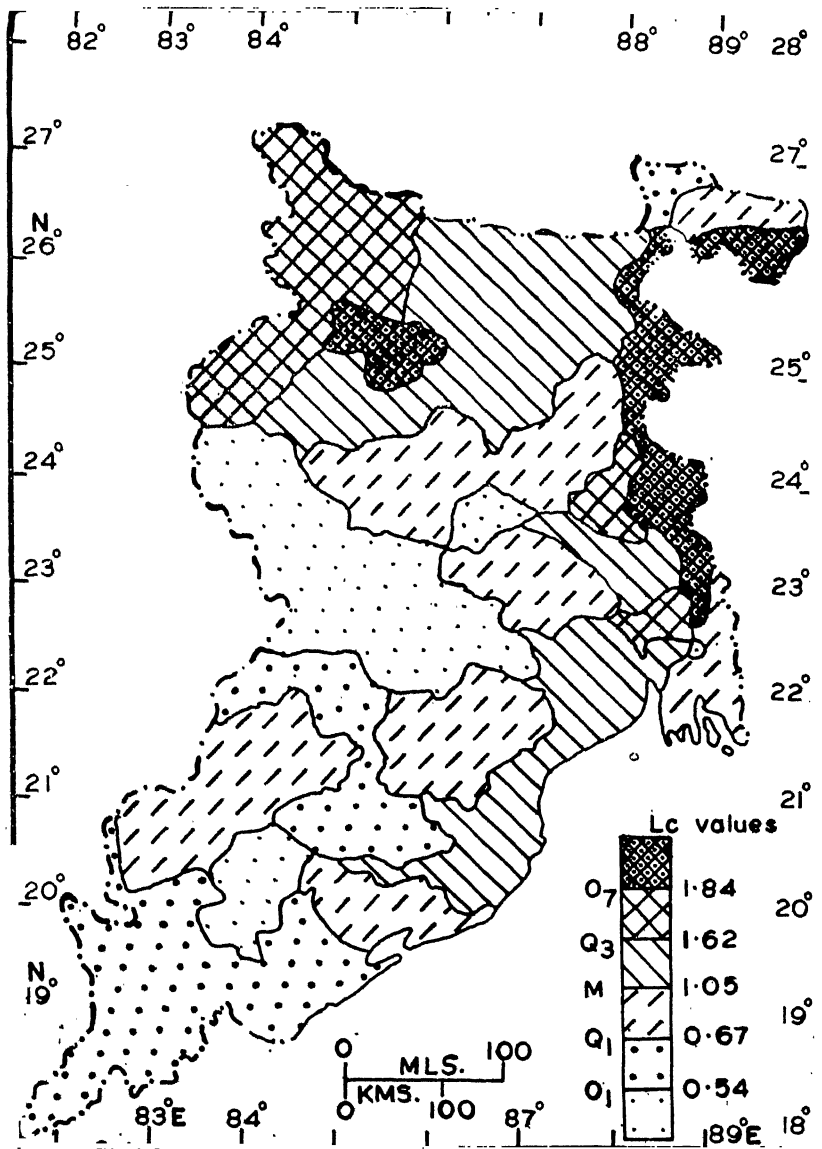
Fig. 2.10 : Bihar, Orissa, & W. Bengal—Concentration of Gross Cropped Area, 1971

The distribution of gross cropped area indicating the intensity of cultivation also shows a similar pattern with only slight variation in some districts (Table 2.7. Fig. 2.10).

The agricultural land is utilized to the maximum capacity in the plain areas and the areas having irrigational facilities (Table 2.8 and Fig. 2.11). However, the relationship between the share of gross area irrigated and those of gross cropped area does not seem to be close.

TABLE 2.6 : Concentration of Net Sown Area, 1971

Category	Measure of Dispersion	L_c Value	Name of District
I (Very High)	Above O_7	Above 1.65	W. Dinajpur, Malda, Cooch Behar, Nadia and Balasore.
II (High)	$Q_3 - O_7$	1.46—1.65	Murshidabad, Birbhum, Hooghly, Burdwan, Patna and Muzaffarpur.
III (Med. High)	$M - Q_3$	1.14—1.46	Saran, Darbhanga, Shahabad, Champaran, Purnea, Saharsa, Gaya, Howrah, Midnapore, Purulia, Bankura and Cuttack.
IV (Med. Low)	$Q_1 - Q_3$	0.74—1.14	Bolangir, Puri, Mayurbhanj, Sambalpur, Dhenkanal, Bhagalpur, Mongher, Santal Parganas, Hazaribagh, Jalpaiguri and 24-Parganas.
V (Low)	$O_1 - Q_1$	0.62—0.74	Keonjhar, Ganjam, Koraput, Kalahandi, Sundergarh and Darjeeling.
VI (Very Low)	Below O_1	Below 0.62	Singhbhum, Dhanbad, Palamu, Ranchi, Baudh Khondmals and Calcutta (nil).

The agriculture of the area is very much underdeveloped, because it is essentially of subsistence type. More than nine-tenths of the total cropped area is under food crops. Even the lowest figure is 59 per cent, rising up to 100 per cent in some cases (Table 2.9). The subsistence character of agriculture does not show any relationship with the physiographic units. It seems to be dependent on the need for supporting

the population. In contrast the opportunities for diversifying the cropping pattern owing to suitability of climate, irrigational and marketing facilities as in north-western Bihar and central West Bengal (jute), northern West Bengal (tea) and north-western portion of Bihar Plain (sugar) have changed the pattern in many areas.
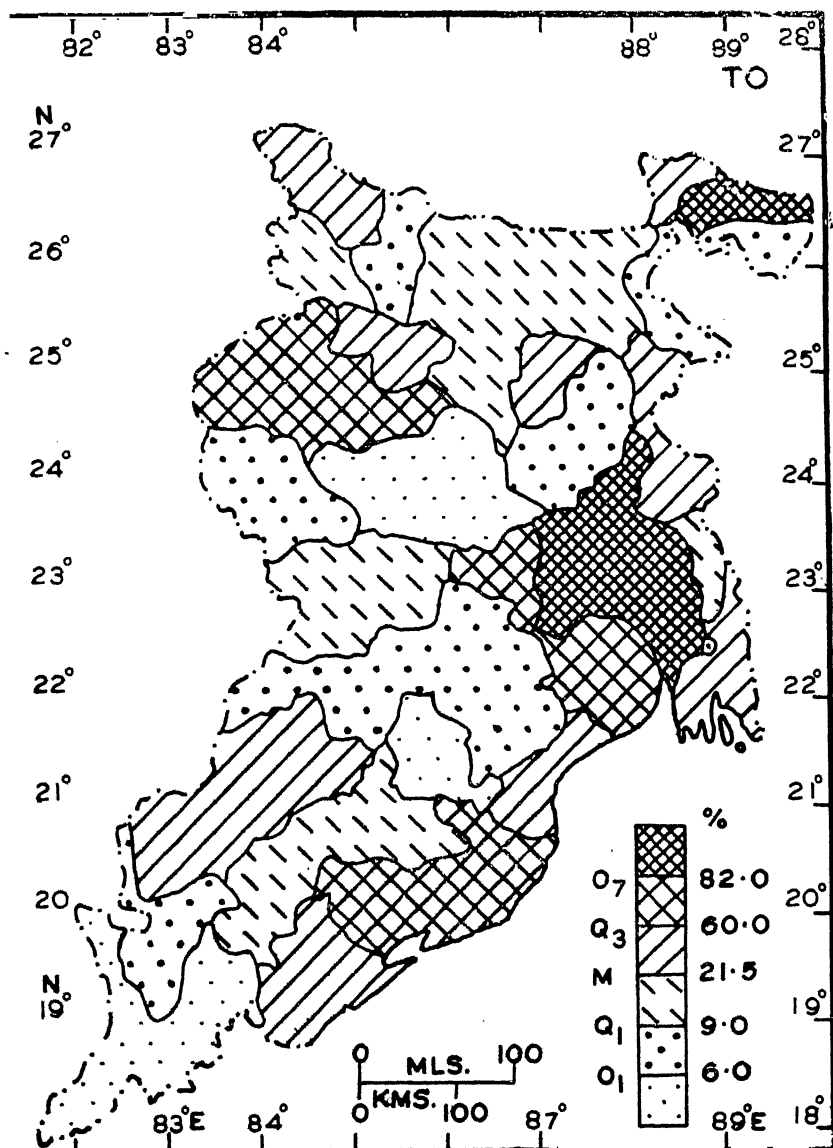
Fig. 2.11 : Bihar, Orissa & W. Bengal—Percentage of Gross Area Irrigated to Gross Cropped Area, 1971

Rice is by far the most important crop of the area. More than half of the total cropped area is put to rice cultivation. The share of total cropped area under rice varies from one-fifth (20.62 per cent) to more than nine-tenth (98.70 per cent) (see Table 2.10). Again the pattern cannot be linked with the physiographic units.

TABLE 2.7 : **Concentration of Gross Cropped Area, 1971**

Category	Measure of Dispersion	I_c Value of gross cropped area	Name of Districts
I (Very High)	Above O_7	Above 1.84	Nadia, West Dinajpur, Murshidabad, Malda, Cooch Behar and Patna.
II (High)	$Q_3—O_7$	1.62—1.84	Shahabad, Champaran, Muzaffarpur, Saran, Hooghly and Birbhum.
III (Med. High)	$M—Q_3$	1.05—1.62	Darbhanga, Saharsa, Purnea, Gaya, Bhagalpur, Mongher, Burdwan, Howrah, Midnapore, Balasore and Cuttack.
IV (Med. Low)	$Q_1—M$	0.67—1.05	Bankura, Jalpaiguri, 24-Parganas, Purulia, Bolangir, Sambalpur, Puri, Mayurbhanj, Keonjhar, Santal Parganas and Hazaribagh
V (Low)	$O_1—Q_1$	0.54—0.67	Dhenkanal, Ganjam, Sundergarh, Kalahandi, Koraput and Darjeeling.
VI (Very Low)	Below O_1	Below 0.54	Singhbhum, Palamu, Dhanbad, Ranchi, Baudh Khondmals and Calcutta (nil).

The yield of the rice per acre also varies greatly. The highest yield has been recorded in the plain districts of West Bengal, followed by the Bihar Plain particularly the northern and western parts. The lowest yield rate is recorded in eastern and southern portions of the Bihar Plain, followed by the districts of Orissa Highlands and Chota Nagpur Plateau. The cause of the lowest yield in the eastern and southern Bihar Plain seem to be fertility of the soil and lack of irrigation facilities, particularly in

eastern South Bihar Plain hindering the cultivation of summer paddy which usually gives lower yield, thereby reducing the total yield rate.

Mining and Quarrying

It is obvious from our previous discussion that the region contains areas rich in mineral reserves and production. About 1.16 per cent of the total workers are engaged in mining and quarrying. Hazaribagh, Dhanbad, Singhbhum, Burdwan, Sundergarh and Keonjhar areas around Chota

TABLE 2.8 : **Percentage of Gross Area Irrigated to Gross Cropped Area, 1971**

Category	Measure of Dispersion	Percentage of gross irrigated area	Name of Districts
I (Very High)	Above O_7	Above 82	Jalpaiguri, Birbhum, Burdwàn, Hooghly, Bankura, Howrah.
II (High)	$Q_3 - O_7$	60—82	Midnapore, Purulia, Puri, Cuttack, Gaya and Shahabad.
III (Med. High)	$M - Q_3$	21.5—60	Darjeeling, 24-Parganas, Murshidabad, Malda, Patna, Bhagalpur, Champaran, Ganjam, Sambalpur, Bolangir and Balasore.
IV (Med. Low)	$Q_1 - M$	9—21.5	Saran, Darbhanga, Monghyr, Saharsa, Purnea, Santal Parganas, Ranchi, Dhenkanal, Baudh Khondmals, Nadia and Cooch Behar.
V (Low)	$O_1 - Q_1$	5.7—9	Mayurbhanj, Sundergarh, Kalahandi, W. Dinajpur, Muzaffarpur and Palamu.
VI (Very Low)	Below O_1	Below 5.7	Singhbhum, Hazaribagh, Dhanbad, Keonjhar, Koraput and Calcutta (nil).

TABLE 2.9 : **Percentage of Gross Cropped Area under Food Crops, 1971**

Category	Measure of Dispersion	Percentage under food crops	Name of Districts
I (Very High)	Above O_7	100	Puri, Cuttack, Ganjam, Midnapore, Birbhum and Dhanbad.
II (High)	Q_3—O_7	98—100	Saran, Patna, Gaya, Shahabad, Mongher and Santal Parganas.
III (Med. High)	M—Q_3	93—98	Champaran, Muzaffarpur, Darbhanga, Bhagalpur, Hazaribagh, Ranchi, Singhbhum, Purulia, Burdwan, Bankura and Kalahandi.
IV (Med. Low)	Q_1—M	80—93	Saharsa, Palamu, Purnea, Dhenkanal, Balasore, Mayurbhanj, West Dinajpur, 24-Parganas, Howrah and Hooghly.
V (Low)	O_1—Q_1	71—80	Bolangir, Baudh Khondmals, Nadia, Cooch Behar, Jalpaiguri, and Darjeeling.
VI (Very Low)	Below O_1	Below 71	Sambalpur, Koraput, Sundergarh, Keonjhar, Calcutta (nil).

Nagpur plateau and northern portion of the Orissa Highland top the list in employing workers in mining (Fig. 2.12, Table 2.11). These areas are followed by Ranchi, Birbhum, Purulia and Dhenkanal, again located in Chota Nagpur plateau and Orissa Highlands. A classification of the district with the help of mean and standard deviation gives better picture. Dhanbad tops the list in employment in mining activities (29.5%, + 5σ), followed by Hazaribagh, Burdwan and Keonjhar (between 7.37 and 10.68% between +1σ and +2σ). Sundergarh, Singhbhum and Dhenkanal districts fall under third category or medium high category with 1.66 to 3.97% (between $\bar{X}$ and +1σ) of their workers engaged in mining activities,

It is these areas which have a high potentiality for attracting people from other districts for employment, some of them are also highly industrialised.

TABLE 2.10 : **Percentage of Gross Cropped Area under Rice, 1971**

Category	Measure of Dispersion	Percentage Gross cropped area under rice	Name of Districts
I (Very High)	Above O_7	Above 86	Midnapore, Bankura, Cuttack, Ganjam and Puri.
II (High)	Q_3—O_7	75.4 — 86	Purulia, Burdwan, Balasore, Singhbhum, Dhanbad and Birbhum.
III (Med. High)	M—Q_3	57 — 75.4	W. Dinajpur, 24-Parganas, Howrah, Dhenkanal, Jalpaiguri, Cooch Behar, Santal Parganas, Hooghly, Sambalpur, Ranchi, Bolangir, Kalahandi.
IV (Med. Low)	Q_1—M	45 — 57	Hazaribagh, Sundergarh, Gaya, Purnea, Keonjhar, Champaran, Malda, Darbhanga, Murshidabad, Mayurbhanj, Koraput.
V (Low)	O_1—Q_1	39 — 45	Baudh Khondmals, Shahabad, Bhagalpur, Nadia, Muzaffarpur, Saharsa.
VI (Very Low)	Below O_1	Below 39	Darjeeling, Patna, Saran, Palamu, Mongher and Calcutta (nil).

Manufacturing (Industrialisation)

So far as industrialization in 1971 is concerned Howrah, Calcutta and 24-Parganas districts topped in the area under study where more than 25% of workers engaged in manufacturing (Table 2.12 and Fig. 2.13. They fall

in the category 'extremely high' (above $+2\sigma$), followed by Singhbhum and Hooghly districts under very high category (above 17.84%, $+1\sigma$). These districts have a high degree of attraction for persons from other districts
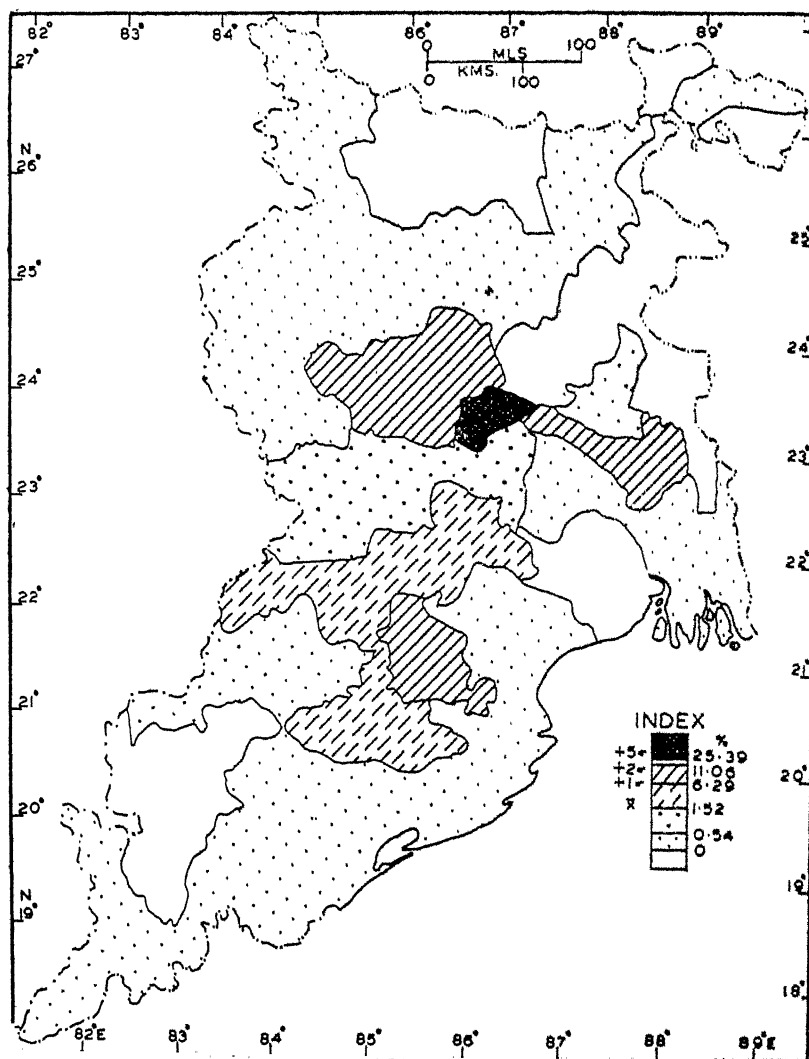
Fig. 2.12 : Bihar, Orissa & W. Bengal—Share of Total Workers Engaged
in Mining, 1971

TABLE 2.11 : **Percentage of the Total Workers engaged in Mining, 1971**

Category	Measures of Dispersion	Percentage of workers in mining	Name of Districts
I (Extremely High)	Above +5σ	Above 25.37	Dhanbad.
II (High)	+1σ to 2σ	6.29 — 11.06	Hazaribagh, Burdwan & Keonjhar.
III (Med. High)	X̄ to 1σ	1.52 — 6.29	Sundergarh, Singhbhum and Dhenkanal.
IV (Med. Low)	Below X̄	0.54 — 1.52	Purulia, Sambalpur and Ranchi.
V (Very Low)	—	0.1 — 0.54	Palamu, Santal Parganas, Gaya, Shahabad, Mongher, Birbhum, Bankura, Koraput, Mayurbhanj, Balasore, Cuttack.
VI (Extremely Low)	—	0 — 0.1	Patna, Saran, Champaran, Bhagalpur, Jalpaiguri, 24-Parganas, Howrah, Calcutta, Bolangir, Ganjam & Puri.

in search of employment. Burdwan, Sundargarh, Dhanbad and Nadia are also important in this respect.

Trade and Commerce

In trade and commerce Calcutta tops among the other districts with 28.98% of its workers engaged in this profession (above 5σ) (Table 2.13) followed by Howrah (12.77% between +1σ and +2σ) under very high category. 24-Parganas, Hooghly, Nadia, Darjeeling, Burdwan and Jalpaiguri of West Bengal ; Patna and Dhanbad of Bihar ; and Ganjam, Cuttack and Puri of Orissa have medium high position in trade and commerce (above 4%). A high level of employment in this occupation denotes higher development of these districts.

Population Characteristics

The total population of the area under study was 122,609,995 in 1971. It was unevenly distributed over an area of 4,17,573.9 sq. kilometres. This works out to a population density of 293 persons per sq. kilometre as

TABLE 2.12 : **Percentage of Total Workers engaged in Manufacturing, 1971**

Category	Measure of Dispersion	Percentage of workers in manufacturing	Name of Districts
I (Extremely High)	Above +3σ	Above 25.78	Howrah and Calcutta.
II (Very High)	+2σ to +3σ	18.78 — 25.78	24-Parganas.
III (High)	+1σ to +2σ	11.78 — 18.78	Singhbhum and Hooghly.
IV (Med. High)	X̄ to 1σ	4.78 — 11.78	Burdwan, Dhanbad, Sundergarh and Nadia.
V (Med. Low)	Below X̄	3 — 4.78	Ranchi, Sambalpur, Mongher, Patna, Cuttack and Darjeeling.
VI (Low)	—	2 — 3	Shahabad, Bhagalpur, Jalpaiguri, Malda, Murshidabad, Birbhum, Bankura, Midnapore and Purulia.
VII (Very Low)	—	1 — 2	Bhagalpur, Gaya, Champaran, Muzaffarpur, Darbhanga, Purnea, Santal Parganas, Palamu, Hazaribagh, Cooch Behar, West Dinajpur, Balasore, Dhenkanal, Keonjhar, Bolangir, Koraput, Ganjam and Puri.
VIII (Extremely Low)	—	Below 1	Kalahandi, Baudh Khondmals, Mayurbhanj, Saharsa.

compared to 167 for the country as a whole. About 46, 36 and 18 per cent of the total population of the study areas are contained on 42, 21 and 36 per cent of the total area in Bihar, West Bengal and Orissa States respectively. The density of population for the respective States is 504, 324 and 140 persons per sq. kilometre for West Bengal, Bihar and Orissa.

Spatial Pattern of Population : The spatial pattern of population in the study area seems to be organised around two centres (Table 2.14, Fig. 2.14) : the first around industrialized urbanized Calcutta and the second around agricultural Patna belt. The third belt around Cuttack is not so distinct.

TABLE 2.13 : **Percentage of Total Workers engaged in Trade and Commerce, 1971**

Category	Measures of Dispersion	Percentage of Workers in trade and Commerce	Name of Districts
I (Extremely High)	Above +5σ	Above 25.63	Calcutta
II (High)	+1σ to +2σ	8.71—12.94	Howrah.
III (Med. High)	$\bar{X}$ to +1σ	4.48—8.71	24-Parganas, Hooghly, Nadia, Darjeeling, Burdwan, Jalpaiguri, Dhanbad, Patna, Ganjam, Puri, Cuttack and Sundergarh.
IV (Med. Low)	—	3 — 4.48	Shahabad, Gaya, Mongher, Bhagalpur, Purnea, Singhbhum, Cooch Behar, W. Dinajpur, Birbhum and Sambalpur.
V (Very Low)	—	2 — 3	Saran, Champaran, Muzaffarpur, Darbhanga, Saharsa, Santal Parganas, Palamu, Hazaribagh, Ranchi, Bankura, Midnapore, Purulia, Keonjhar, Balasore, Baudh Khondmals, Bolangir and Koraput.
VI (Extremely Low)	—	Below 2	Mayurbhanj, Dhenkanal and Kalahandi.

From these centres the density declines in all directions. The decline is very gentle towards west and south. The density varies from 30276 persons per sq. kilometre in the Delta proper to as low as 56 in Orissa highlands (Baudh Khondmals).

The highest density is found in the Delta proper (above $+2\sigma$). It varies from 913 in Hooghly to 1639 in Howrah and 30276 in Calcutta. This zone is highly industrialized, urbanized and commercialized.
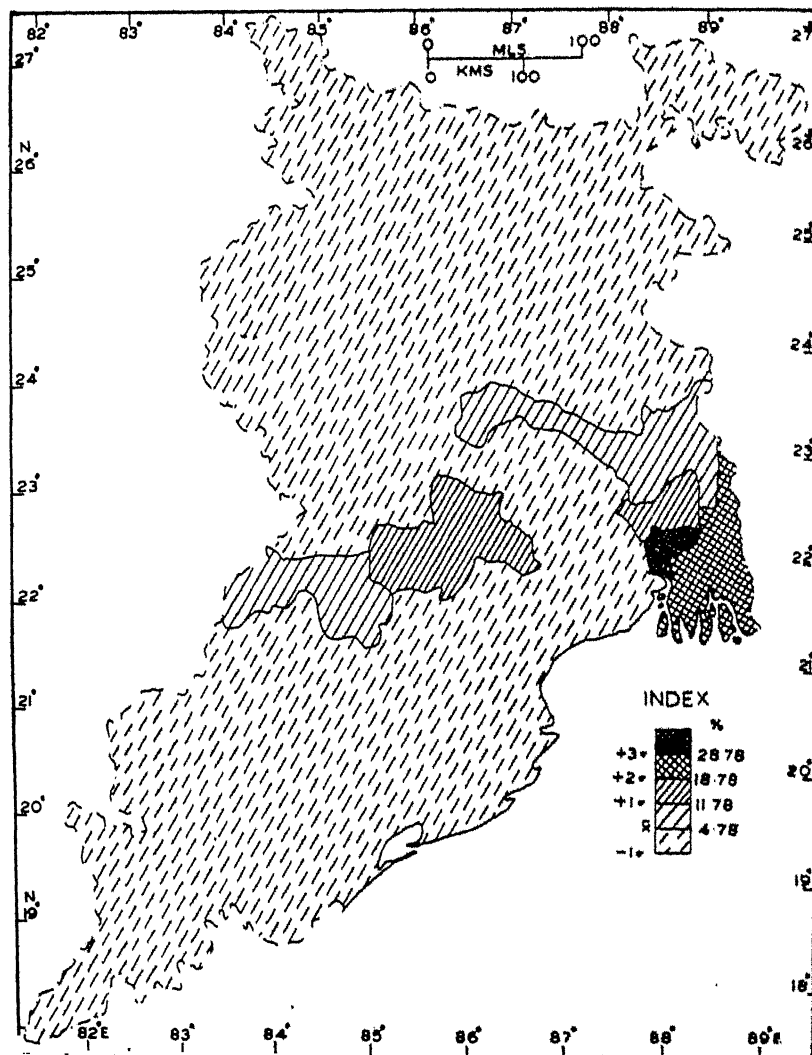
Fig. 2.13 : Bihar, Orissa & W. Bengal—Share of Workers Engaged in Manufacturing, 1971

THE STUDY AREA : ITS GEOGRAPHICAL AND ECONOMIC BASE

Agriculturally also it is very productive. This zone includes Calcutta district (which is entirely urban) with exceptionally high density where more than three million people reside over an area of 104 sq. kilometres.

A compact zone of high density (above 606 persons per sq. kilometre and between +1σ to +2σ) occurs west of the Kosi river in North Bihar Plain and in the irrigated northern portion of South Bihar Plain. This compact zone includes Patna, Saran, Muzaffarpur and Darbhanga districts of Bihar. It is one of the most densely settled tracts of rural India, as well

TABLE 2.14 : **Distribution of Population, 1971**

Category	Measure of Dispersion	Density of population per sq. km.	Name of Districts
I (Extremely High)	Above +4σ	Above 1118	Calcutta and Howrah.
II (Very High)	+2σ to +3σ	777 — 947	Hooghly.
III (High)	+1σ to +2σ	606 — 777	Patna, Saran, Muzaffarpur, Murshidabad and 24-Parganas.
IV (Med. High)	X̄ to +1σ	435 — 606	Darbhanga, Nadia, Burdwan, Dhanbad.
V (Med. Low)	−1σ to X̄	264 — 435	Gaya, Shahabad, Champaran, Mongher, Bhagalpur Saharsa, Purnea, Cuttack, Balasore, Jalpaiguri, Cooch Behar, W. Dinajpur, Malda, Birbhum, Bankura and Midnapore.
VI (Low)	−2σ to −1σ	94 — 264	Santal Parganas, Palamu, Hazaribagh, Ranchi, Singh-bhum, Kalahandi, Sambalpur, Bolangir, Ganjam, Sundergarh, Dhenkanal, Puri, Keonjhar, Mayurbhanj, Darjeeling and Purulia.
VII (Very Low)	Below −2σ	Below 94	Koraput and Baudh Khondmals.

as agriculturally the most prosperous area of Bihar Plain. Another district which falls under this category is 24-Parganas (612). It is located near Calcutta belt and many large and small scale industries have centributed to its high density.

The areas of moderate population density (between 435 and 606 persons per sq. km.) are found around Calcutta and Patna Zones of very high density. The districts surrounding Calcutta industrial belt are Nadia, Burdwan, Murshidabad and Dhanbad. Cooch Behar district lies away from this central region. These areas are either agriculturally prosperous or are marked by large scale development in mining (Asansol-Durgapore-Dhanbad region). The districts surrounding Patna agricultural belt include Shahabad, Gaya, Mongher, Bhagalpur, Champaran, Saharsa and Purnea. These districts have very fertile soil and are agriculturally developed.

TABLE 2.15 : **Change in Population, 1961-71**

Category	Measure of Dispersion	Percent Change	Name of Districts
I (Very High)	Above $+2\sigma$	Above 39.25	West Dinajpur.
II (High)	$+1\sigma$ to $+2\sigma$	31.83—39.25	24-Parganas, Malda, Cooch Behar, Koraput, Sundergarh and Saharsa.
III (Med. High)	$\bar{X}$ to $+1\sigma$	24.41—31.83	Purnea, Palamu, Hazaribagh. Dhanbad, Keonjhar, Cuttack, Balasore, Dhenkanal, Puri, Jalpaiguri, Murshidabad, Nadia, Hooghly, Burdwan and Midnapore.
IV (Med. Low)	-1σ to $\bar{X}$	16.99—24.41	Patna, Gaya, Shahabad, Saran, Champaran, Muzaffarpur, Darbhanga, Bhagalpur, Santal Parganas, Ranchi, Singhbhum, Ganjam, Sambalpur, Bolangir. Baudh Khondmals, Mayurbhanj, Darjeeling, Howrah, Birbhum, Bankura and Purulia.
V (Low)	-2σ to -1σ	9.57—16.99	Mongher and Kalahandi.
VI (Very Low)	Below -2σ	Below 9.57	Calcutta.

The areas of medium low density (200 to 400 persons per sq. km.) occur in the transition zone of plateaus and plains. The Ganga and the Kosi flood plains, the coastal plains and the Himalayan fringes. The

districts located at plateau fringe are Shahabad, Gaya, Mongher, Bhagal-pur, Birbhum, Bankura and Midnapore. These districts partake the characteristics of both plain as well as plateau environment, which have a depressing effect on population density. The districts of Saharsa, Purnea, West Dinajpur and Malda are located in the Ganga, the Kosi and the Mahananda flood plains, while Cuttack and Balasore lie in the Delta of Mahanadi and the Subarnarekha respectively. Here the population density is low due to low agricultural and industrial development as well as due to regular floods. Similarly the low density in Champaran, Jalpaiguri and Cooch Behar districts is caused by the rugged hilly and forested landscape in parts of the Himalayan fringe.
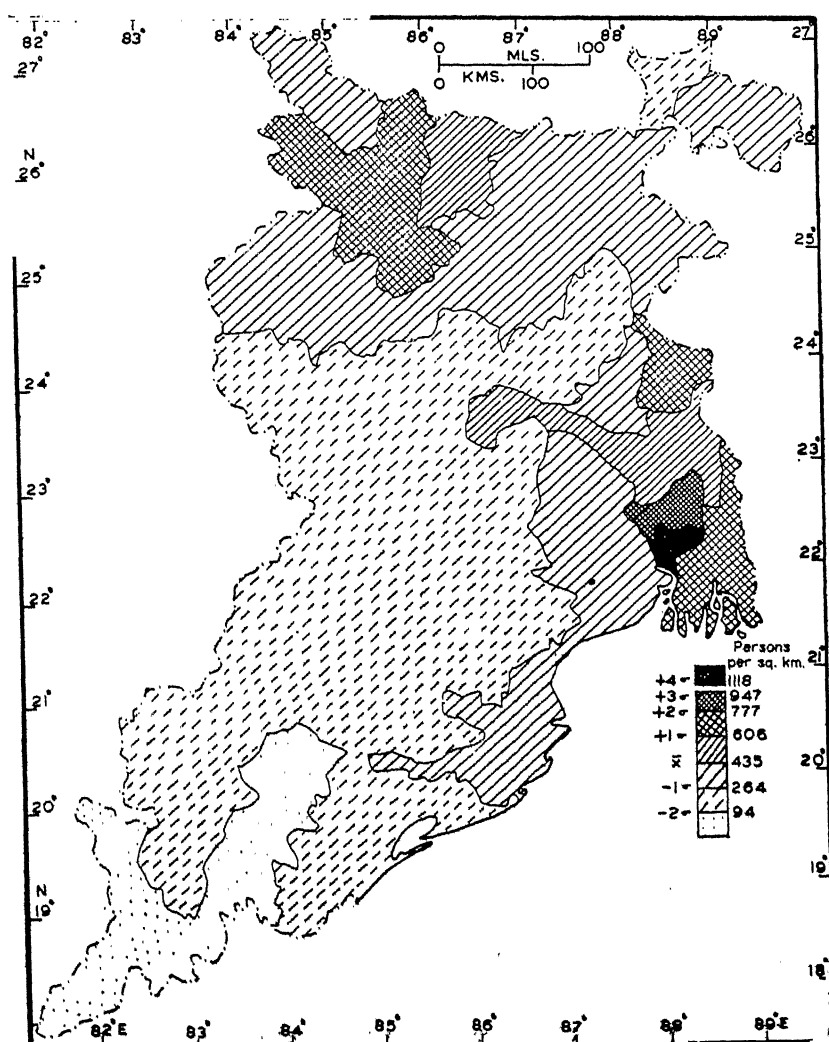
Fig. 2.14 : Bihar, Orissa and W. Bengal—Density of Population, 1971

Broadly speaking, the whole of the Peninsular upland ischarac terized by very low population density (less than 200 persons per square kilometre). The Chota Nagpur plateau and Orissa Highlands, constituted by Hazaribagh, Singhbhum, Ranchi, Palamu, Ganjam, Bolangir,
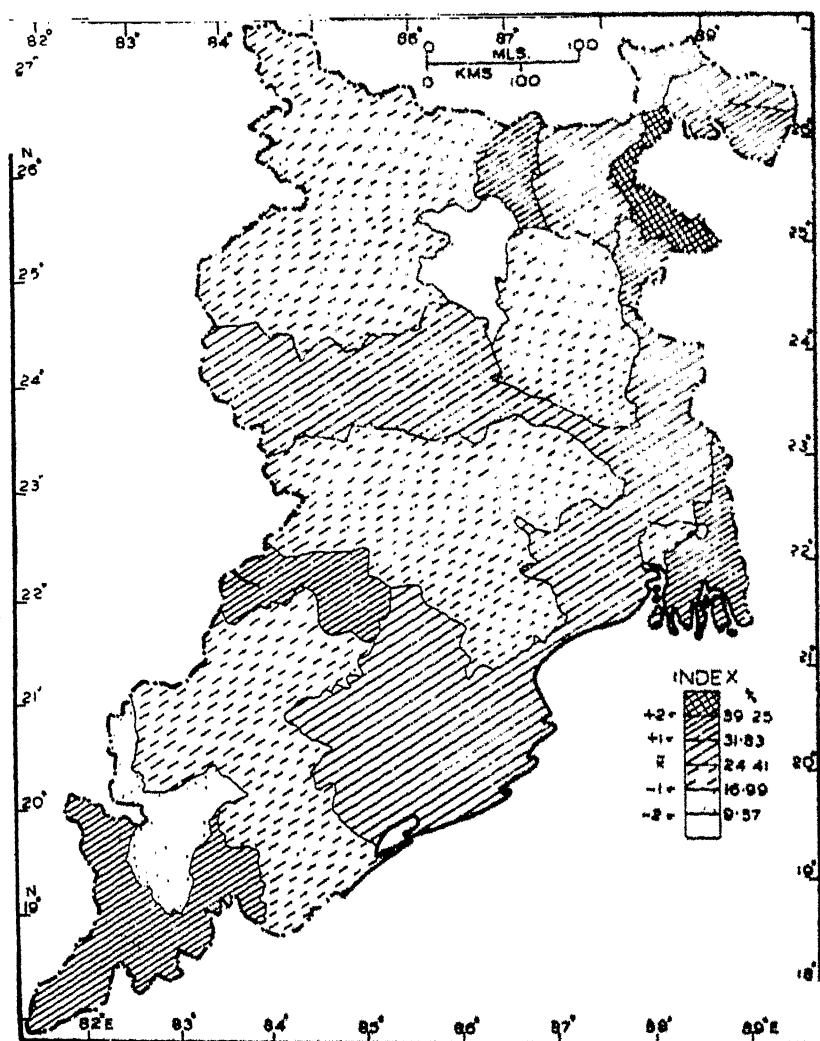
Fig. 2.15 : Bihar, Orissa and W. Bengal : Population Change, 1961-71

Keonjhar, Mayurbhanj, Sundergarh, Sambalpur, Dhenkanal, Kalahandi, Koraput and Baudh Khondmals contain 46% of the total area but supports only 19% of the total population. This upland exhibits only a few pockets of densely populated tract near major towns.[45]

Pattern of Population Change : The population of the study area rose to 24.41% during 1961-71. The growth varies from 38 62% in West Dinajpur to 7.58% in Calcutta. So far as the regional pattern of population growth is concerned West Dinajpur district of West Bengal experienced very high population growth during 1961-71 (Table 2.15, Fig. 2.15) followed by Saharsa, 24-Parganas. Malda, Cooch Behar, Sundergarh and Koraput districts under high category.

The areas of lower population density exhibited greater percentage of population growth. This rule is violated only in the areas which had a higher proportion of urbanization and industrialization. Where the existing population was already high, even a relatively high growth in numbers could not but result in low percentage of variation.

Urbani zation

On an average, 13.84% of the total population of the study area reside in urban centres. The figure varies from 100% in Calcutta to 2.78% in

TABLE 2.16 : **Percentage of Urban to Total Population, 1971**

Category	Measures of Dispersion	Percentage of Urban population	Name of Districts
I (Extremely High)	Above $+5\sigma$	100	Calcutta.
II (High)	$+1\sigma$ to 2σ	29.06—45.28	Dhanbad, Howrah and 24-Parganas.
III (Med. High)	$\bar{X}$ to 1σ	13.84—29.06	Patna, Singhbhum, Darjeeling, Nadia, Hooghly, Burdwan and Sundergarh.
IV (Med. Low)	Below $\bar{X}$	10 -- 13.84	Mongher, Bhagalpur, Hazaribagh, Ranchi, Sambalpur, Ganjam.
V (Low)	—	5 — 10	Gaya, Shahabad, Champaran, Muzaffarpur, Purnea, Santal Parganas, Jalpaiguri, Cooch Behar, West Dinajpur, Murshidabad, Birbhum, Bankura, Midnapore, Purulia, Keonjhar, Balasore, Cuttack, Bolangir, Koraput and Puri.
VI (Very Low)	—	Below 5	Saran, Darbhanga, Saharsa, Palamu, Malda, Mayurbhanj, Dhenkanal, Baudh Khondmals and Kalahandi.

Mayurbhanj, Dhanbad, Howrah and 24-Parganas districts have a very
high degree of urbanization (above 35% ; +1σ), followed by Patna, Singh-
bhum, Darjeeling, Nadia, Hooghly, Burdwan and Sundergarh districts
under high category (above 20% and between X̄ and +1σ) (Table 2.16
and Fig 2.16). The more highly urbanised districts are also marked by a
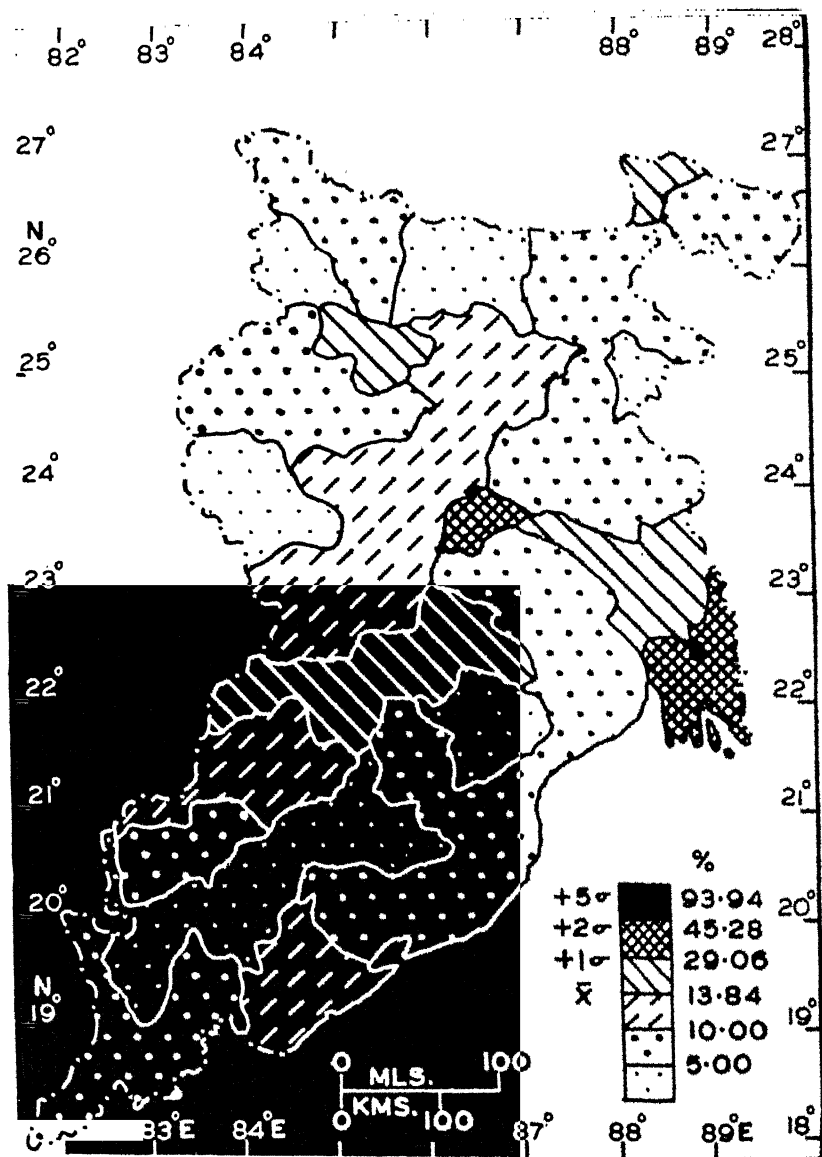
Fig. 2.16 : Bihar, Orissa and W. Bengal—Share of Urban Population, 1971

high degree of industrial development which has attracted people to these areas for employment. Areas with sedentary agriculture, or phsically difficult terrain are much less urbanised.

Working Force : Workers account for 30.58% of the total population which is largely constituted by males (89%). Only 11% of the total workers are females. The share of workers in total population varies from 37.01 per cent in Calcutta to 24.77 per cent in Nadia. Champaran, Saharsa, Darjeeling, Calcutta, Sambalpur, Baudh Khondmals and Koraput districts have the highest share of workers to total population (above 34%), followed by Gaya, Mongher, Bhagalpur, Purnea, Santal Parganas, Palamu, Ranchi, Dhanbad, Singhbhum, Jalpaiguri, Purulia, Sundergarh, Keonjhar, Mayurbhanj, Bolangir and Ganjam with medium high (above 30.58%) share (Table 2.17). The percentages are high both minerally rich and in backward districts. In the fertile agricultural belt, however, the percentages are generally low. They are also low in urbanised districts.

TABLE 2.17 : **Percentage of Workers to Total Population, 1971**

Category	Measure of Dispersion	Percentage of workers	Name of Districts
I (High)	$+1\sigma$ to $+2\sigma$	34.40—38.22	Champaran, Saharsa, Darjeeling, Calcutta, Sambalpur, Baudh Khondmals and Koraput.
II (Med. High)	$\bar{X}$ to 1σ	30.58—34.40	Gaya, Mongher, Bhagalpur, Purnea, Santal Parganas, Palamu, Ranchi, Dhanbad, Singhbhum, Jalpaiguri, Purulia, Sundergarh, Keonjhar, Mayurbhanj, Bolangir, Kalahandi and Ganjam.
III (Med. Low)	-1σ to $\bar{X}$	26.76—30.58	Patna, Shahabad, Muzaffarpur, Darbhanga, Hazaribagh, Cooch Behar, West Dinajpur, Malda, Hooghly, Burdwan, Bankura, Balasore, Cuttack, Dhenkanal and Puri.
IV (Low)	-2σ to -1σ	22.94—26.76	Saran, Murshidabad, Nadia, 24-Parganas, Calcutta, Birbhum and Midnapore.

The majority of the workers are engaged in primary occupations. The percentage varies from 0.4 in Calcutta and 33.4 in Howrah to 92.0 in Saharsa. The area under study is highly agrarian and, as such most of

the people depend on primary occupations for their livelihood. This occupation contributes more than 80% of the total employments in the two-thirds of the districts. Only in eleven districts it comes down to below 70%.

The percentage of secondary occupations is the highest in Dhanbad (44 0%) followed by Howrah (32.2%), Calcutta (30.2%), Burdwan (23.1%), 24-parganas (23.0%), Hooghly (22.0%) and 8 other districts. The tertiary occupations are very important in Calcutta (69.3%), because it is the commercial hub of not only the area under study but also of the whole country. It is followed by Howrah (29.2%), Darjeeling, 24-Parganas (23.8%), Patna (23.2%), Hooghly (22.0%), Sundergarh (20.3%), Dhanbad (20%) and six other districts. Both the secondary and tertiary occupations show marked regional variation, because of uneven industrialization and urbanization.

Transport and Communication

The area under study lacks an efficient, quick and well developed transport system for the movement of people and goods. The development of transportation network is relatively greater in those parts where physical obstacles such as rugged terrain or meandering rivers are less or there has been sufficient industrialization. Strategic location has made Calcutta the focus of the transportation network (Fig. 2.17). Away from Calcutta the density and intensity of transportation network decreases. It rises again near Cuttack, Ranchi, Dhanbad, Patna and Siliguri, which form nodes of lesser importance.

The total length of railways in the study area is 10,682 kilometres, shared to the extent of 51, 31 and 18 per cent by Bihar, West Bengal and Orissa respectively. The density of rail distance per 100 sq. kilometres is 3.5, 3.1 and 1.2 kilometres respectively in West Bengal, Bihar and Orissa. It reveals that the rail facilities are comparatively greater and more complete in West Bengal. In contrast, the central part of Orissa Highlands is still untouched by railways and is one of the most inaccessible tracts of the region. Calcutta and the Damodar valley regions are better served because they have achieved relatively higher degree of industrialization.

The study area has about 2,48,334 kilometres of road length shared to the extent of 55, 21 and 24 per cent by Bihar, West Bengal and Orissa respectively. 29 per cent of the total road length is surfaced. The proportion of surfaced to total road length is, 38, 29 and 18 per cent in West Bengal, Bihar and Orissa respectively. The length of surfaced roads per 100 sq. kilometres is 23 kilometres each in West Bengal and Bihar and only 7 kilometres in Orissa.

So far as the percentage of total workers employed in transport and communication is concerned Calcutta again tops the list with extremely high category (13.56%, above $+5\sigma$) (Table 2.18) followed by

Howrah and Dhanbad and Darjeeling under very high category (above $+2\sigma$ and $+1\sigma$ respectively). Patna and Singhbhum districts of Bihar, Burdwan, 24-Parganas, Hooghly, Jalpaiguri, Purulia, Midnapore and Nadia districts of West Bengal and Sundergarh district of Orissa are in the medium high category (between $\overline{X}$ and $+1\sigma$; above 2% and ranging up to 4.49%).
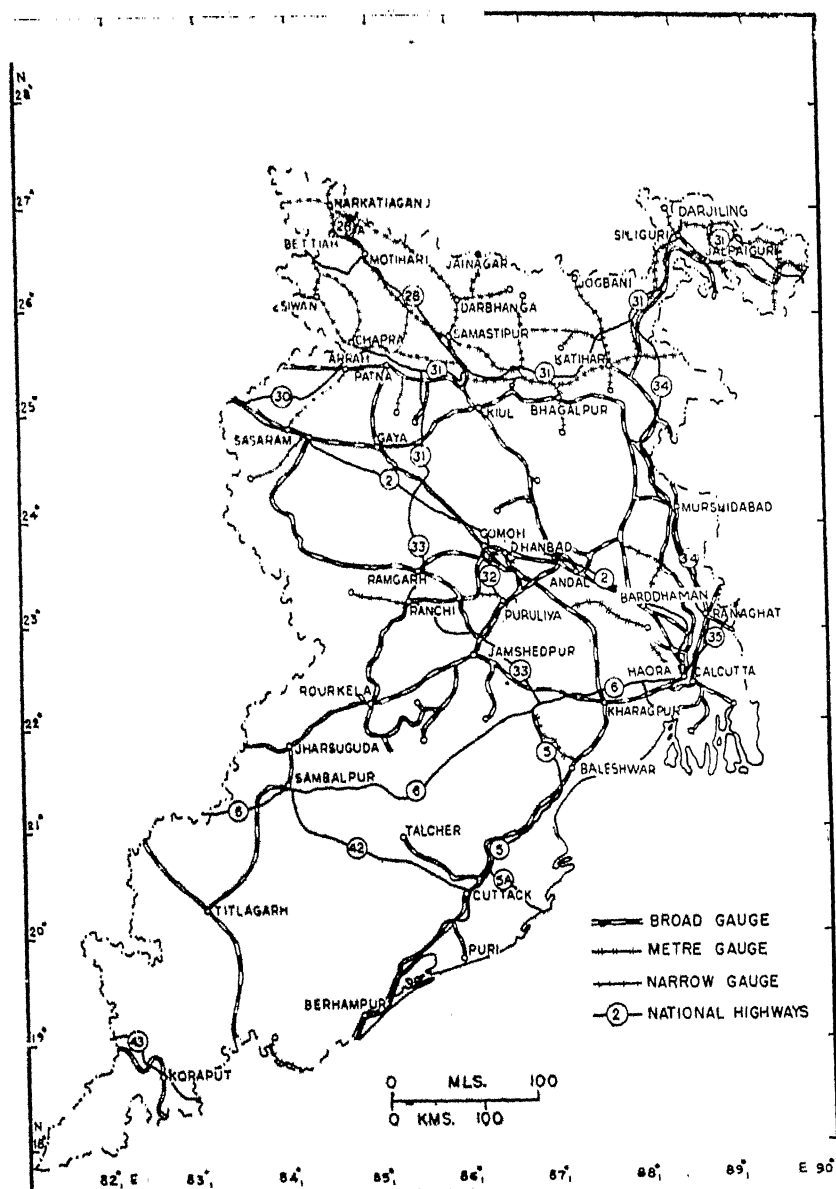
Fig. 2.17 : Bihar, Orissa and W. Bengal—Transportation Network

TABLE 2.18 : **Percentage of Total Workers engaged in Transport and Communication, 1971**

Category	Measure of Dispersion	Percentage of workers in transport and communication	Name of Districts
I (Extremely High)	Above +5σ	Above 13.56	Calcutta.
II (Very High)	+1σ to +3σ	4.60—9.08	Howrah, Dhanbad and Darjeeling,
III (Med. High)	$\bar{X}$ to +1σ	2.36—4.60	Patna, Singhbhum, Jalpaiguri, Nadia, 24-Parganas, Hooghly, Burdwan, Midnapore, Purulia and Sundergarh.
IV (Med. Low)	—	1.5—2.36	Mongher, Hazaribagh, Ranchi, Malda, Sambalpur, Keonjhar, Cuttack and Puri.
V (Low)	—	1—1.5	Gaya, Shahabad, Saran, Darbhanga, Bhagalpur, Purnea, Santal Parganas, Palamu, Cooch Behar, West Dinajpur, Murshidabad, Birbhum, Bankura, Balasore, Baudh Khondmals, Koraput and Ganjam.
VI (Very Low)	—	Below 1	Champaran, Muzaffarpur, Saharsa, Mayurbhanj, Dhenkanal, Bolangir and Kalahandi.

It will be noted that employment in this category is high in areas which are either economically developed due to mining, industrial and urban development or are physiographically difficult areas such as Darjeeling.

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3

Data Base and Analytical Framework

THE present study is concerned with two variables—population mobility and the levels of economic development. This chapter outlines the sources of migration data, available in India: their characteristics and reliability, and discusses the choice of the indicators of economic development as well as the operational definitions and the methods of analysis used.

Population Mobility

Sources of Migration Data : Migration can be estimated from records of population movement, i.e., vital registration of the persons moving from one political unit to another. Such data are available only for international migration. Direct measurement of internal migration is possible only in countries where a migration question is posed at the Census or where there is a system of residence registration. This is the only satisfactory basis for calculating the volume and direction of migration streams. Alternately, indirect measurements may be made by one of the following methods.[1]

Migrants can be estimated by comparison of two good consecutive censuses either by vital statistics method, which estimates the total net gain or loss in population as a result of migration by subtracting total net natural increase from total intercensal change ; or by the survival ratio method, which estimates the proportion of the population which should be expected to survive at the second Census and determines the differences between the expected surviving population and the actual population. But due to lack of reliable vital statistics the above mentioned methods cannot be applied.[2]

The volume and direction of migration can also be estimated by place of birth statistics available in the Census either by comparing place of birth with place of current residence or by comparing the place of last residence with the current place of residence.[3]

Some of the scholars have estimated internal migration with the help of the percentage of total population in minority linguistic groups.[4] Still others have used "family allowance transfers" made available by the Family

Allowance Division of the Department of National Health and Welfare,[5] or the data related to labour force migration cross-classified by age and level of education.[6] Transit statistics can also be used but it too has very limited use and now has a rather secondary position.[7]

It appears from the above discussion that migration records are probably the least satisfactory of all population data, partly because the collection is poorly organised and partly because population is inherently difficult to standardize in units for counting. Migration is a vague statistical concept, with a few uniform criteria to determine who is a migrant and who is not.[8]

History of Birth Place Statistics in India : Statistics of migration has traditionally been collected by the Indian Census with reference to the place of birth since the first synchronous Census of 1881 and this practice continued till the 1961 Census. Till 1931, the data on internal migration was of limited value. It provided information only for that sector of internal migration which involved crossing of Provincial/State/Agency boundary. Even this much data could not be given in 1941 Census due to the outbreak of the World War II. In 1951 Census, the data related to within and between district migration was published but rural/urban classification of the 'place of birth statistics' was postponed for the subsequent Censuses. In 1961 Census, the rural/urban origin and a duration of residence at the place of enumeration were also ascertained. However, such a classification has the drawback of referring to the type of origin being rural or urban at the time of Census rather than at the time of migration. In 1971 Census, there has been a significant improvement by introducing the concept of 'last residence' along with the birth place for eliciting detailed information on migration pattern. The study of internal migration in India has in the past, been seriously handicapped by the inadequacies of data on volume, origin and direction of migration streams and the demographic, social and economic characteristics of the migrants. However, the 1961 and 1971 Censuses offer valuable material for comprehensive studies in internal migration.[9]

Nature of the Migration Data : Data on migration in 1961 Census was collected with reference to the following questions on the Individual slip.

(a) Birth place,
(b) Whether born in village or town,
(c) Duration of residence.

The scope of the data was further expanded in 1971 Census and the following questions were put to each individual.

(i) Birth Place :
    (a) Place of birth,
    (b) Rural/Urban,

    (c) District,
    (d) State/Country,
  (ii) Last Residence
    (a) Place of last residence,
    (b) Rural/urban
    (c) District,
    (d) State/Country, and
  (iii) Duration of Last Residence at the village or town of Enumeration.

The question on last residence has been introduced for the first time in 1971 Census. The questions on birth place data in 1971 Census have been made more detailed and explicit than in 1961. The improvement in the questionnaire format is expected to improve the quality of migration data in 1971 Census but the Convasser system in the Census suffers from a general weakness which has its bearing on the quality of Census data.[10] Though the information on the Individual slip relates to an individual, it is rarely filled up by contacting the person concerned. As it is not possible for the enumerator to contact each and every individual in practice, the information is generally filled for all the members of the household by contacting the head of the household. This has its inherent limitations, particularly for such items of the individual slip where time element in involved.

Tabulation Programme of the Migration Statistics : In 1961 Census, the following tables were prepared and published from the migration data.

D—I	Non-Indian Nationals.
D—II	Place of Birth.
D—III	Migrants classified by place of birth and duration of residence in place of enumeration.
D—III (Appendix)	Migrants from other States and outside India (less than 5 years duration) classified by age-groups.
D—IV	Migrants to cities classified by sex, broad age-groups, educational levels and in case of workers also by occupational divisions and groups.
D—V	Cities showing population born locally, migrants from rural areas and migrants from other towns and cities.
D—VI	Distribution of Industrial categories of workers and non-workers by place of birth.

The migration tables of the 1971 Census are as follows :

D—I	Population classified by place of birth.

D—I   Persons Born in other Districts of the State and Enu-
(Appendix I) merated in this District.

D—II   Migrants classified by place of last residence at the
               place of Enumeration.

D—II   Migrants by State of last residence and Age for
(Appendix)   duration of residence of 0-9 years—Males-Females.

D—III   Migrants to cities classified by place of last residence
               and duration of residence.

D—IV   Population of cities classified by place of last residence
               and duration of residence.

D—V   Migrants : Workers and non-workers according to
               main activities classified by place of last residence.

D—VI   Migrants classified by place of last residence, Age-
               groups, duration of residence and marital status.

Comparability of 1961 and 1971 Migration Statistics : It is clear that
in 1971 Census all the tables, except D-I and its Appendix, have been
prepared on the basis of last residence concept. The first-two tables, viz.,
D-I, D-II and their appendices have, however, been prepared on the basis
of one per cent advance tabulation. These tables as well as the other tables
of 1971 Census were also to be prepared subsequently on the 10 per cent
rural and 20 per cent urban samples. The tabulation in 1961 Census was
based on 100 per cent data. In addition to the difference in definition of
a migrant only table D-VI differs in two Censuses in regard to its cross
classification.

It may be noted that for comparative study of migrants in 1961 and
1971, population classified by place of birth is the only common table in
the two Censuses. Moreover, the concepts of rural/urban, adopted in the
two Censuses are also different.[11]

Thus results of both the Censuses may not be strictly comparable due
to the presence of sampling variability in the latter.

The 1961 Census adopted the rural/urban status of birth place as
existing at the time of enumeration, while in 1971 Census, it was done on
the basis of the status of the place at the time of birth of the person. The
coverage on duration of last residence in 1971 Census was even greater
than that in 1961. It included those persons also who were eligible
as migrants according to last residence but not so by birth place.

The Reliability of Birth Place Statistics : The data on birth place
and last residence are easy to collect on a Census schedule and are pro-
bably more accurate because most persons know where they have come
from and where they were born. However, the migration data on 'place
of birth concept' has certain obvious limitations.[12] A migrant who returns

to the place of birth between the two Census counts is not counted as a migrant at any place. The counting of children born at a place (which is due to cultural reasons) other than the usual place of residence of their parents disturbs artificially the migration data. Besides it does not reveal the step migration from village to small town and to large town or city. Moreover, the tabulation plan does not permit to build outmigration.

Data Base of the Present Study : The present study is based entirely on the secondary sources of data, available in the Census of India publications and other published and unpublished data available with the Census authorities and the Director of Statistics of the respective States. Since the study area is large, actual surveys have been ruled out, because even small percentage of samples would have yielded large volumes of data.

Despite some of the limitations of the place of birth statistics, these have been used as the basis of study, since the other sources of migration data are even more defective. Migrants could have been estimated with the help of the birth and death statistics, but they are quite defective on account of under-reporting.

The Unit and Period of Study : The district has been chosen as the smallest unit of the study, because migration data is not available below district level. Moreover, since comparable data on district level is available only in the 1961 and 1971 Censuses, the study pertains only to the 1961-1971 period. For the sake of convenience districts as existing in 1971 have been used for the analysis of the migration data.

The data for migration study have been collected from Table D-II of the migration tables of the respective States for the 1961 Census[13] and from Table D-I of the Migration Tables of the Census of India 1971 (unpublished) from the Census authorities of the States. The data of both the tables are based on 'place of birth concept'. However, while the data of the former is based on 100 per cent enumeration, that of the latter is based on 10 per cent rural and 20 per cent urban samples.

Scope of the Present Migration Study : Considering the availability of the data, the present study is concerned with the following aspects of internal migration in Eastern India during 1961-71.

    (i) Regional pattern of total migration in 1971 and trends of change during 1961-71,

   (ii) Regional pattern of the share of male migrants in 1971 and trends of change in it during the above mentioned period,

 (iii) Total migrants classified by distance, i.e., short, medium and long distance migration in terms of intra-district, inter-district and inter-State migration together with their spatial pattern and trends of change,

    (iv) Male migrants classified by distance, together with their regional pattern and trends of change,

    (v) Total migrants classified by direction of movements, viz., rural to rural, rural to urban, urban to urban and urban to rural in terms of the spatial and temporal pattern,

    (vi) Direction of movements classified by sex composition, particularly males,

    (vii) Direction of movements classified by distance covered, and

    (viii) Direction of male migrants classified by distance covered.

Operational Definitions

Migrants : The term migrant has been used as a synonym to population mobility, especially immigrants. It refers in this study to the persons who are enumerated at a place other than their place of birth.

    Total Migrants : It refers to the percentage of total population enumerated at a place other than their place of birth.

    Male Migrants : It refers to those males among the total population who are enumerated at a place other than their place of birth.

    Short Distance Migrants are those who migrated within the district of birth. Such migrants have also been called intra-district migrants.

    Medium-Distance Migrants is a term that refers to those who migrated from one district to another, but within the State of enumeration. Such migrants have also been called inter-district migrants.

    Long-Distance Migrants are those who migrated from one State to another State, but within the country of enumeration. Such migrants have also been termed inter-State migrants. Such migrants include even the migrants from the adjoining districts of the neighbouring States.

    Rural to Rural Migrants are those who were born in a rural area and have been enumerated in a rural area.

    Rural to Urban Migrants refers to those who were born in a rural area but have been enumerated in an urban area.

    Urban to Urban Migrants are composed of such migrants who were born in an urban area and have been enumerated in another urban area.

    Urban to Rural Migrants are those who were born in an urban area but were enumerated in a rural area.

The Method of Analysis

Measuring Volume and Direction of Migration : The percentage of total population not born at the place of enumeration has been taken as an indicator of population mobility. The change in population mobility is indicated by (i) changes in the percentage of mobile to total population, (ii) differential growth in immobile and mobile population or total and immobile population ; and (iii) change in the contribution (rank) of

individual district in the population mobility of the area under study in 1961 and 1971.

A comparative study of the distribution of total and immobile population among the districts has a great relevance in ascertaining the shift in the levels of population mobility. An improvement or deterioration in the rank of total population could be linked with a corresponding improvement and deterioration in the rank of immobile population. Whenever the contribution of a district for its immobile population increases or decreases proportionately with the similar increase or decrease in the total population, there is no change in population mobility. Alternatively, if the contribution to immobile population of a district increases or decreases at a higher rate than that of the total population over a period of time it may be concluded that its mobility has been reduced or increased respectively. This implies that under the condition of unchanged population mobility, a gain or loss in the total population of a district over a period of time cannot be devoid of a similar gain or loss in its immobile population. This is a good measure since it would differentiate the population increment on account of natural increase left at the place of birth and that on account of immigration. However, it cannot be used to ascertain the magnitude of outmigrants and their role in the population growth of a district.

Another method for measuring the shift in population mobility involves a comparative review of the decadal growth rates for the total and immobile population. Under the assumptions of constant population mobility and natural increase, the growth rates of total and immobile population should not differ from one another. Alternatively, if the natural increase remains fixed and the growth rates of the total population increase or decrease at a higher pace than that of the immobile population, a decline or an improvement in the population mobility can be expected.

Statistical and Cartographic Methods Applied to Discern Spatial Pattern of Migration : First of all the percentage share of the mobile population in total population and mobile males in total males have been calculated for all aspects of the study. Then the data has been classified for mapping with the help of the mean as the measure of central tendency and standard deviation (σ) as the measure of dispersion for normally distributed data.[14] The skewed data, however, were classified with the help of median, quartiles and octiles for mapping purposes. The data classified in this way have normally been used for preparing choropleth maps to show the spatial pattern of distribution of the phenomena over the area under study. However, some pie diagrams have also been prepared to show the regional concentrations of the sex composition of migrants, types of distance covered and directions of movements. In order to

preclude the influence of the size of area and the size of population on the analysis of migration, location coefficients (L_{cs}) and location quotients (L_{cs}) have also been calculated.[15] Location coefficient is a measure of concentration of distribution of a phenomenon in a region If the L_c value for a district is one, it means the district has just the share of the migrants should have, i.e., the district's share of the migrant is in proportion to its area. Higher is L_c value, higher is the concentration of migrants in the district. The location coefficient can be expressed in mathematical form in the following way :

$$L_c = \frac{P_i}{A_i}$$

where P_i = Percentage of the migrant in the i'th area, and

              A_i = percentage of the area contained in the i'th areal sub-unit.

Location quotient is a ratio between percentages of two types of distributions in an area. If the value of L_q is one, it indicates that the two distributions are proportionately equally represented in the district. An index of less than one indicates an under representation of the share of migrants in the area and vice-versa. The location quotients have been calculated with the help of the following formula :

$$L_q = \frac{X_i}{Y_i}$$

where X_i = percentage of the migrants in the i'th area, and

              Y_i = percentage of the total population in the i'th areal sub-unit.

The L_{cs} and L_{qs} have been classified with the help of mean and standard deviation for preparing choropleth maps.

In order to show the nature of distribution of the total and male migrants over the study area Lorenz curves for them have been prepared. The Lorenz curve was devised for measuring concentration of income or wealth.[16] It can be used to measure the concentration of migrants. For its construction the areal units are arranged in order of decreasing share of migrants together with percentage of area of the corresponding areal unit. Then the cumulated percentages of area are plotted (on Y-axis) against cumulated percentages of migrants (on X-axis). If the curve follows the diagonal, the migrants are evenly distributed. If the migrants are concentrated at one point, the curve coincides with the X-axis. Between

these extremes, degree of uneven spread of population are depicted by the departure of the curve from the diagonal. Monkhouse has termed such curve as 'cumulative curve'.[17]

For studying the trend of change in the different categories of migrants, the percentage changes were calculated for each district. Again in order to avoid the biasing effects of percentage the increase in the number of respective category of migrants was calculated. All such data were classified in the manner mentioned above for preparing the choropleth maps. L_{cs} were calculated for such data also to show the nature of distribution of the increase in number of migrants. L_{qs} were also calculated to show the relationship between increase in total population and increase in the number of total and male migrants during 1961-71.

Economic Development

Indicators of Economic Development : Since the levels of development are not directly measurable, one must select suitable indicators. A development indicator should represent some aspect of development such as industrialization, health, equality, participation, etc., because development involves changes in structure, capacity and output. It may be a direct measure of an economic or social variable, or more often, an indirect measure of some non-measurable phenomena, viz., standard of living. Drewnowski[18] is in favour of indicators limited to observable and measurable phenomena.

Indicators may be disaggregated, composite (aggregated) or representative. In the first case a complex phenomena is broken into a number of elements or components, and indicators are selected to represent the different components. Ideally these elements should be homogeneous, mutually exhaustive and mutually exclusive. In the second case, a single indicator is constructed by combining a number of indices, involving some system of weighing indices. In the third case, a representative indicator is selected as the best measure of a particular phenomenon on the basis of some criteria such as closeness of correlation with other indicators of the same phenomenon. In all three cases the validation of the indicator depends on its reliability, sensitivity and accuracy and on the consistency of its relation to other development indicators. The justification for selection of a particular indicator and a particular process of selection will depend, however, on the purpose for which they are to be selected. Thus the selection of indicators requires subjective judgment on the part of the researcher.

The meaning of the levels of development has had different connotations to various scholars. They have historically acquired a certain meaning, though this is not precise or universally valid. The procedure

of measuring the levels of development must, therefore, attempt to tap these implications as best as possible. A regional analyst has thus to work out definite procedures for measuring and constructing an operational index for development. A good deal of literature has come up in the last few decades on the indices measuring quantitatively the levels of development.[19] The essential test of acceptability of these indices is how best it approximates the essence of the concept. There is no foolproof method of reaching an operational index from the theoretical concepts except by making a number of judgements. These can roughly be grouped into two categories :

1. Selecting an indicator or indicators for formulating composite index ; and
2. Deciding the nature of relationship among the variables of the composite index.

Some crude indices of development can be evolved with the help of single indicators such as the level of an activity (or some derived indicator such as the co-efficient of location), per capita income, level of urbanization, employment, etc. The technical difficulties and need for subjective judgment in this uni-variate analysis is considerably less but it fails to catch the real connotation of the word[20] because development is multi-dimensional.

The proper choice of indicators constitutes the crux of the methodology, which in turn depends on theoretical assumptions. Raza has amply demonstrated the selection of such indicators which are really not related to or expression of economic development in developing countries but their selection is made on account of the influence of the conventional Anglo-Saxon theories of regional development.[21]

The choice of indicators of regional development should distinguish between the basic forces and derivative results ; and base itself on the intrinsic relationship between spatial and sectoral processes in a holistic frame. With such an approach, the groups of economic, demographic, and social indicators, or individual indicators within each group, reflect different aspects of a phenomenon, which in spite of its complexity and its apparently fragmented character, is essentially one.

General Indicators : Per capita income is perhaps the best single measure of economic development[22] of a region. It is an aggregative type of indicator, wholly capable of evaluating the combined effect of several indicators of the economy in grading the districts on the ladder of development. However, the variations in the real purchasing power of money may reduce its suitability as a good indicator of economic development. Moreover, it would not distinguish between the qualitative differences of

development, as the same monetary income from primitive practice of cultivation and modern industry or government service does not have the same bearing on the current stage of development.

However, this indicator could not be used for want of district level data available for the respective periods.

Capital output ratio indicates the stage of development through technological advancement and capital available for consumption and saving. This indicator also could not be utilized due to non-availability of the data.

Capital formation as percentage of gross product will indicate current development as well as future development. This can be shown in terms of saving per head. Saving or capital formation depends on the need of consumption and investment in providing necessary services. This also depends on the pressure of man on land. This type of data is not available.

Urbanization reflects the horizontal movement of people in response to changes in the sectoral structure associated with economic development.[23] In the urban areas, secondary and tertiary sectors of the economy are more developed and they offer relatively greater amenities of living and higher educational and cultural facilities. It can be expressed as the percentage of urban population to total population. Sometimes, however, it does not indicate urbanization but simply urban accretion, such as, when rural-urban stream is not absorbed by and large into a corresponding expansion of the secondary sector in the urban areas, it leads to urban accretion and not urbanization in true sense of the term.[24] Despite this lacuna, urbanization is an accepted indicator of development.

The share of workers to total population is also a good indicator, because it shows the level of dependence on the working force which has a definite bearing on the standard of living and saving etc. The ratio of workers to total population also indicates attractiveness of the region (district) in terms of economic opportunity, however, it may indicate lower economic level, because in a poor society the share of workers is relatively higher, particularly in tribal areas.

The share of workers engaged in non-agricultural activities definitely indicates the level of economic development, because it shows that the modern sectors of the economy like manufacturing and mining etc. have been able to absorb more and more workers and relieve the pressure on cultivable land. Non-agricultural activities, no doubt, include some of the primary activities also such as forestry, hunting, fishing and animal husbandry but in the case of the area under study their share is likely to be negligible. Thus, it has been considered as a good general indicator of economic development.

Indicators of Agricultural Development : Though over-dependence on agriculture and related pursuits indicate backwardness of the economy, there is a need to study the relative development of agriculture for measuring the economic condition of the people engaged in cultivation. The level of the development in this case can best be reflected in agricultural efficiency. Thus it is reflected in the total production from a particular unit area and in per acre yield. However, the gross value of agricultural output per agricultural worker would be the best indicator of agricultural development. It accounts for total production as well as their market value. Unless the farmers receive higher price for their produce, cultivation will not bring prosperity to them. A slight deviation of this indicator is the gross value of agricultural output per hectare of net area sown. But no such data is available on district level for all the district of the study area. In their absence the following indirect indicators can be studied.[25]

1. Cultivable area per agricultural worker,
2. Net area sown per agricultural worker,
3. Area sown more than once as percentage to net sown area,
4. Percentage of gross irrigated area to gross sown area, and
5. Wage rates of agricultural workers.

The first indicator will throw light on the availability of land to workers, which is the basic requirement in agriculture. However, availability of more land would not bring economic prosperity unless appropriate modern agricultural practices are followed.

The second is also a good indicator of agricultural development, because all the cultivable area is not sown every year. The share of net sown area to total cultivable area indicates the fertility of the soil. So net area sown per agricultural worker is a refinement of the first indicator, i.e., cultivable area per agricultural worker.

Intensity of cropping is yet another good indicator of agricultural prosperity. Other things being equal, the more the number of crops raised in a year from a piece of land, the higher is the level of agricultural development. The percentage of area sown more than once to net area sown is, therefore, an important economic indicator. It is a composite end-expression of effort in three directions : area, yield and cropping pattern and an urge for cash crops.

Irrigation is an important input of agriculture. It is also an indirect measure of total inputs that go with irrigation, viz., better techniques, manures, fertilizers, high yielding varieties of seeds, pesticides and a higher level of farming activity and the urge for cash crops. Therefore,

the percentage of gross irrigated area to gross area sown is good economic indicator.

All these four indicators will mainly point out the economic condition of cultivating class. As more than two-fifths (44%) of the agricultural workers are agricultural labourers, their wage rates have been selected as a separate indicator. The higher is the wage rate, the better would be their economic condition.

Indicators of Industrial Development : The role of industries in economic development cannot be overemphasized. It is a modern sector of economy on which the development in other sectors depends. Hence the indices formed to measure industrial development are very important. The per capita value of industrial output could have been the best single indicator of industrial development, because it accounts for industrial output, income generated and value added by manufacturing, etc. However, the district level data for this is not available. In its absence other indirect measures can be used. The number of registered working factories per thousand sq. km. can be taken as a measure of intensity of industrialization. But all the factories do not have the same impact. So the number of workers employed in them per lakh of population along with per cent share of total workers engaged in non-household industries have been taken as an indicator of the impact of industrialization on the economy. This includes the share of total workers engaged in industries, number of registered working factories per thousand square kilometre and workers per lakh of population employed in registered working factories. Since the size and capacity of registered working factories to provide employment would vary greatly, so the number of registered working factories per thousand kilometre is not a good indicator, and has not been used in the present study.

Indicators of Trade and Commerce : Simultaneously with urban and industrial development tertiary activities, particularly trade and commerce, develop in a region. No trade statistics worth mention are available on district level. The per capita sales tax would have been a good indicator provided the tax structure were the same in all the States. Moreover, such data is collected on the basis of commercial circles which do not correspond to the districts. In its absence the percentage of workers in trade and commerce out of total workers has been taken as an indicator.

The development of regional infra-structure is a prerequisite for the development of agriculture, industry and urban centres.[26] It includes development of transportation networks, power supply, irrigational facilities, educational and technical institutions, etc.

Indicators of Transport Development : Roads constitute a very important infra-structural item of economic development. The mileage

of surface roads per 100 sq. km. and per lakh of population are generally the two indicators adopted to measure the relative development of different areas.

The per capita motor spirit tax is a good indicator of the development of road transport, because it combines in itself the number of vehicles, miles run and also the load carried, because the consumption of petrol or diesel is higher in heavy transport vehicles.[27]

The direct aspect of the road traffic concerning the economy of the district is the number of goods carriers. In the absence of the data relating to ton-mileage carried, the number of goods vehicles per lakh of population has been selected as an indicator of goods traffic. The number of commercial vehicles indicates the intensity of economic activities. Although the vehicles registered in one district do not necessarily confine their activities to that district, nevertheless, the location of the registration indicates the centre of all their activities and is an accepted indicator of economic prosperity.[28]

The persons employed in transport has been used as an indicator of development of transportation in the district.

Health Indicators : With economic development health condition and educational facilities also improve. So the indicators of health and educational development would certainly point out the levels of economic development. The expectancy of life, if available districtwise, would have been a good indicator of health condition. Since this is not available the general death rate can serve the purpose, but the compilation of such a rate still suffers from the defect of incomplete coverage as deaths are generally not reported, and the data is also not properly compiled in different areas. The maternal death rate per thousand birth (live and still) is another indicator of the health conditions. Here non-reporting, if any affects both the numerator and the denominator in the same proportion. The infant death rate is also an alternative, but this also suffers from the defect of non-reporting in different proportions for the numerator and the defect of denominator of the rate and inaccuracy in age-reporting of the infants. In existing conditions only hospital beds per lakh of population has been chosen as in indicator of health conditions, because it shows the level of medical facilities available. Though the hospital beds are not meant only for the district in which the hospital is situated, particularly large hospitals and medical colleges, nevertheless it is a good indicator of health conditions.

Indicators of Educational Development : Effective literacy (percentage of literates to population above 5 years of age) is a good indicator of educational development, particularly in a case like India where literacy is very low. However, the data for effective literacy could not be

available and hence crude literacy (percentage of literates to total population) has been taken as an indicator of educational development. It is a general index of cultural and technological advance. The percentage of school-going children in the age-group 6-14 years is another good indicator of the state of affairs in educational sphere. It throws light on the effort with which the lack in education is being made up. But such data is not available for all the districts of the study area so this also could not be included as an indicator of economic development. The scholars per lakh population, per capita expenditure on education and educational institutions per lakh of population are other possible indicators but no such comparable data for the respective periods under study are available.

Indicators of Power Development : As economic prosperity rises, the per capita electric power consumption generally increase. Hence, per capita consumption of electricity can be a good indicator of economic development. Another indicator would be per capita consumption of inanimate energy per kg. of coal equivalent. These data, however, are not available. Hence they could not be included in deciding the levels of development of the districts.

To summarise, the following are the parameters finally selected for the present study to indicate the level of economic development in the region :

    (i) Percentage of urban to total population,

    (ii) Percentage of workers to total population,

    (iii) Percentage of the total workers engaged in non-agricultural activities,

    (iv) Cultivable area per agricultural worker,

    (v) Net area sown per agricultural worker,

    (vi) Percentage of area sown more than once to net area sown,

    (vii) Average daily wages of agricultural labourers,

    (viii) Percentage of workers engaged in manufacturing,

    (ix) Workers per lakh of population employed in registered working factories,

    (x) Percentage of total workers employed in trade and commerce,

    (xi) Hospital beds per lakh of population,

    (xii) Percentage of literates to total population,

    (xiii) Percentage of workers employed in transport,

    (xiv) Surfaced road length per thousand square kilometre.

    (xv) Surfaced road length per lakh of population, and

    (xvi) Number of vehicles on road per lakh of population.

The data for the indicators of economic development were collected from the publications of the Census of India, Director of Statistics and Planning Boards or Department of Planning and Evaluation of the respective States together with some unpublished data available with the Directors of Statistics.[29]

Methods Applied for Analyzing the Levels of Economic Development

For analyzing the data on the levels of economic development, the districts were ranked for each indicator, because the data for the different indicators are in different units of measurement. By summing up ranks of all the indicators composite ranks were obtained.

In order to know the degree of association among the indicators the Kendall Coefficient of Concordance (W) has been computed with the help of the following formula :[30]

$$W = \frac{S}{\frac{1}{12} K^2(N^3-N) - K\Sigma_T T}$$

Where S = Sum of squares of the observed elevations from mean of the composite index that is,

$$S = \left(Rj - \frac{\Sigma Rj}{N} \right)^2$$

K = number of sets of rankings, e.g., is indicator in the present study,

N = Number of entities (here districts) ranked, 46 in this case.

$$T = \frac{\Sigma(t^3-t)}{12}$$

Where t = number of observations in a group tied for a given rank.

Σ = sum over all groups of ties within any one of the K rankings,

$\Sigma_T T$ = sum of the values of T for all the K rankings.

To make it more clear suppose :
There are two sets of ties in the X ranking (any one indicator) and the number of observations tied is two, then

$$T_x = \frac{\Sigma(t^3-t)}{12} = \frac{(2^3-2)+(2^3-2)}{12} = 1$$

There are three sets of ties with two observations in each case in the y (other indicator) ranking, then

$$T_y = \frac{\Sigma(t^3 - t)}{12} = \frac{(2^3 - 2) + (2^3 - 2) + (2^3 - 2)}{12} = 15$$

In the z rankings, there are two sets of ties, one set consists of 4 observations and the other set consists of three observations, then

$$T_z = \frac{\Sigma(t^3 - t)}{12} = \frac{(4^3 - 4) + (3^3 - 3)}{12} = 7$$

Knowing the values of T for the x, y and z rankings, we may find their sum : $\Sigma_T T = 1 + 1.5 + 7 = 9.5$.

With the above information, 'W' may be computed for tied with the help of the above mentioned formula.

The significance of the 'W' for large sample, when N is larger than 7, can be tested with the following formula :

$$X^2 = K(N-1)W$$

with $\quad$ df $= N = 1$

'W' is a measure of the relationship among several ranks. It thus expresses the degree of association among the indicators for the 46 districts. If they all agree $W = 1$. If they differ very much among themselves the sum of ranks will be more or less equal, and consequently the sum of squares (S) become small compared with the maximum possible value and so 'W' is small. As 'W' increases from 0 to 1 the deviations become more different and there is greater measure of agreement in the rankings.[31]

By using the composite indices the districts of the study area have been categorized into six levels of economic development with the help of median, quartiles and octiles, and the same has been mapped with the help of choropleth technique.

Methods used for Relating Levels of Economic Development and Migration : For knowing the nature of relationship between the levels of economic development and the volume of total and male migrants in 1971 ; and between change in the levels of economic development during 1960-61 to 1970-71 and the change and increase in the magnitude of total and male migrants, scatter diagrams have been constructed.[32] To

know the relationship precisely Spearman rank correlation coefficients (r_s) were calculated with the help of the following formula :

$$r_s = \frac{\Sigma x^2 + \Sigma y^2 - \Sigma d^2}{\sqrt{\Sigma x^2 \; \Sigma y^2}}$$

Where $\Sigma x^2 = \dfrac{N_3 - N}{12} - \Sigma T_x$

and $\Sigma y^2 = \dfrac{N_3 - N}{12} - \Sigma T_y$

The significance of the coefficients (r_s) were tested by using the following formula :

$$t = r_s \sqrt{\frac{N-2}{1-r_s^2}} \; \dots \text{ for a large sample, N is larger than 10.}$$

with $df = N - 2$

The Spearman's rank correlation coefficient has been applied for knowing precisely the relationship between the levels of economic development and the volume of migration, because the data are not normally distributed (a precondition for using Pearson r). Moreover, the measure of the levels of economic development are available in ordinal scale.[33]

The efficiency of the Spearman rank correlation, when compared with the most powerful parametric correlation, Pearson r, is about 91%.[34]

Scheme of the Present Study
Since the aim of the present study is to test the hypothesis of transition mobility : Lee's law of migration regarding distance covered by migrants ; and the relationship between the levels of economic development and migration in Eastern India during 1961-71, it has been broken into the following chapters :

Chapter I : Population Mobility—Its significance and Review of Literature :

It deals with the demographic, economic, social and political significance of population mobility ; Review of the important literatures on developed and developing countries and India ; and problem under the present study.

Chapter II: Geographical Base of the Study Area : This chapter is concerned with location and extent and size of the study area together with its physical, economic and demographic background.

Chapter III : Data Base and Analytical Framework : It deals with the sources of migration data available in India ; their characteristics and reliability ; the choice of indicators of economic development, their source, operational definitions and the methods of analysis used.

Chapter IV : Pattern of Population Mobility : This Chapter is concerned with discerning the regional pattern of total and male migrants in 1971 and their trends of change during 1961-71. It also deals with the total and male migrants classified by distance covered and direction of movements, together with trends of change in them during 1961-71 decade.

Chapter V : Levels of Economic Development : This chapter deals with the areas in different (six) levels of economic development based on the sixteen indices.

Chapter VI : Relationship between Levels of Economic Development and Migration : It discusses the relationship between the levels of economic development in 1970-71 and total migration, and male migration in 1971. It also deals with the relationship between change in the levels of economic development during 1960-61—1970-71 and change in total and male migrants ; and increase in total and male migrants during 1961-71.

Chapter VII : Summary and Conclusion.

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4

Pattern of Population Mobility

THE percentage of the persons born at places other than the place of enumeration in total population has been considered as an index of population mobility. The average share of the mobile persons in the total population in the region is 29.83 per cent. The figures for Bihar, West Bengal and Orissa are 27.95, 30.22 and 30.62 per cent respectively. This clearly shows that about two-thirds of the total population are immobile and less than one-third is mobile. The share of mobile persons varies from 21.74 per cent in Murshidabad district of West Bengal to 44.26 per cent in the Dhanbad district of Bihar.

Spatial Pattern of Population Mobility
All the districts of the area under study have been classified with the help of mean ($\overline{X}$) as central tendency and standard deviation (σ) as the measure of dispersion for descerning and mapping the regional pattern of migrants in 1971. The districts have been grouped into six categories : extremely high, very high, high, medium high, medium low and low (Fig. 4.1 and Table 4.1) .

It is obvious from Fig. 4.1 that the regions of very high share of migrants to total population in 1971 have four distinct zones : one comprises Dhanbad district in east-central portion of the Chota Nagpur Plateau (Fig. 2.4) ; the second consists of Sundergarh and Sambalpur districts in north-western part of the Orissa Highlands ; the third include Jalpaiguri and Cooch Behar in the north-eastern section of the Lower Ganga Plain near the Himalayan tract ; and the fourth (Nadia district) in the south-eastern portion of the Lower Ganga Plain. The first is important for industrialization (Fig. 2.13) and mining (Fig. 2.12) ; the second is also industrialized and have important mining areas (Fig. 2.12) ; the third is important for commercial farming ; and the fourth is agriculturally very developed (Figs. 2.8, 2.9 and 2.10) and has comparatively higher share of urban population (Fig. 2.16) and industrialization (Fig. 2.13). The transportation networks (Fig. 2.15) facilitate movements in these areas.
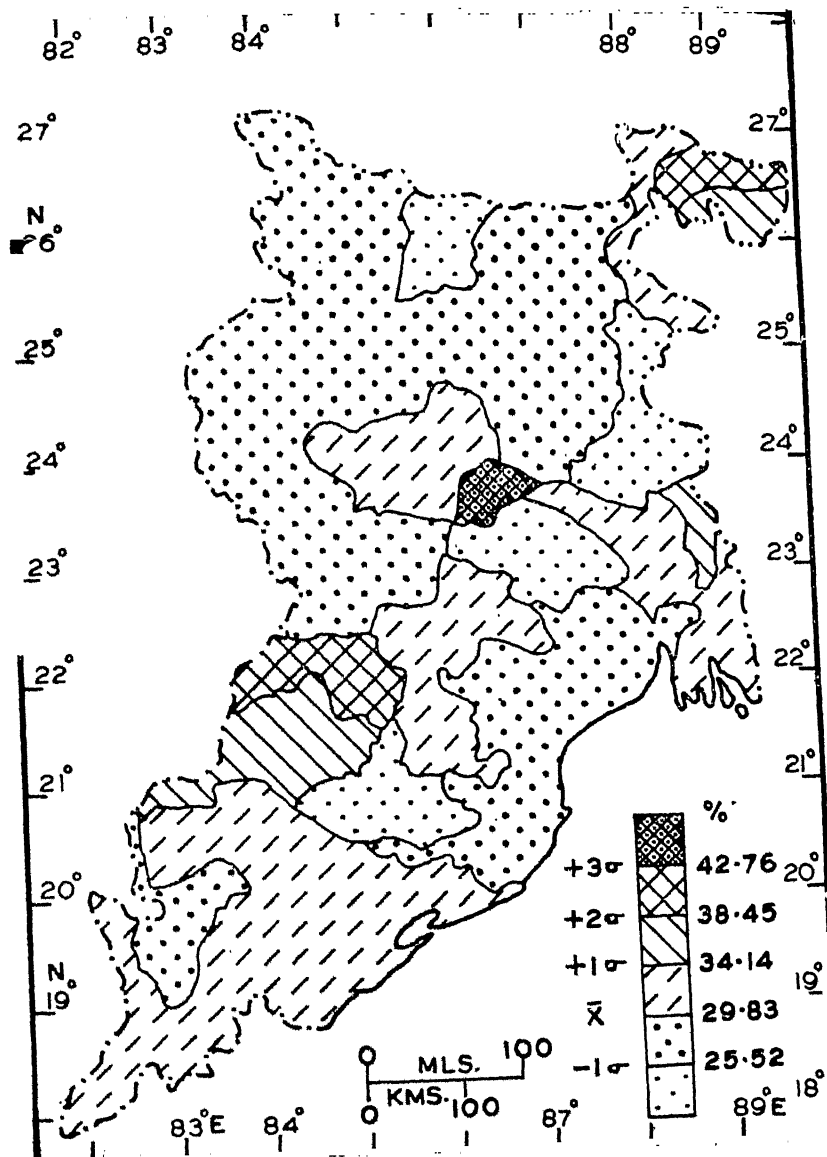
Fig. 4.1 : Bihar, Orissa and W. Bengal—Share of Migrants in Total Population, 1971

The whole of Bihar State including the Bihar Plain and the Chota Nagpur Plateau (excepting Dhanbad, Singhbhum and Hazaribagh), northern portion of the Utkal Coastal Plain, and few patches of the Orissa Highlands (Kalahandi and Dhenkanal) have low share of migrants. The latter are neither industrially nor agriculturally developed

TABLE 4.1 : **Share of Migrants in Total Population, 1971**

Category	Measure of Dispersion	Percentage of migrants	Name of Districts
I (Extremely High)	Above $+3\sigma$	Above 42.76	Dhanbad.
II (Very High)	$+2\sigma$ to $+3\sigma$	38.45 – 42.76	Jalpaiguri and Sundergarh.
III (High)	$+1\sigma$ to $+2\sigma$	34.14 – 38.45	Cooch Behar, Nadia and Sambalpur.
IV (Med. High)	$\bar{X}$ to $+1\sigma$	29.83 – 34.14	Hazaribagh, Singhbhum, Darjeeling, West Dinajpur, 24-Parganas, Calcutta, Hooghly, Burdwan, Keonjhar, Baudh Khondmals and Bolangir.
V (Med. Low)	-1σ to $\bar{X}$	25.52 – 29.83	Patna, Gaya, Shahabad, Saran, Champaran, Muzaffarpur, Mongher, Bhagalpur, Saharsa, Purnea, Santal Parganas, Palamu, Ranchi, Howrah, Midnapore, Balasore, Cuttack, Mayurbhanj, Kalahandi, Koraput, Ganjam and Puri.
VI (Low)	Below -1σ	Below 25.52	Darbhanga, Malda, Murshidabad, Birbhum, Bankura, Purulia and Dhenkanal.

(Figs. 2.8, 2.9, 2.10, 2.11 and 2.13) and are characterized by low urbanization (Fig. 2.16) together with a low density of population (Fig. 2.14).

Surprisingly enough the industrially and commercially developed zone around Calcutta (Fig. 2.13) and having important mining belt of the study area have medium low to medium high share of migrants. This belt includes the Delta proper of the Lower Ganga Plain consisting of the districts of Calcutta, Hooghly and 24-Parganas; and the eastern fringe of the Chota Nagpur Plateau (Burdwan). The most of the district of the Orissa Highlands and southern part of the Utkal Coastal Plain also have medium high share of migrants.

The areas of the lowest share of migrants occur in four scattered patches : one in the central North Bihar Plain (Darbhanga); the second

comprise major portion of the central Lower Ganga Plain (including Murshidabad, Birbhum and Malda) and the third patch consists of Purulia and Bankura (which are industrially and from mining point of view less important). The fourth is in the central part of the Orissa Highlands (Dhenkanal). The first-two are agriculturally more developed while the latter two are neither industrially nor agriculturally developed. They are also characterized by low urbanization (Fig. 2.16).

It is apparent from the above study that industrially developed areas viz., Dhanbad and Sundergarh as well as areas of commercial plantation such as Jalpaiguri have a higher percentage of migrants in their population. But this is not always true. In contrast, agricultural and over-crowded plains and industrially less developed areas and plateau areas have a lower share of migrants in their population. However, the above study does not bring out clearly the relationship of the immigrants with the levels of industrial and/or commercial development or development of plantation agriculture. For example, Calcutta, Howrah, Hooghly, Burdwan and Darjeeling are among the most developed areas, industrially, commercially or in plantation agriculture, but are placed in either medium high or medium low categories on the basis of the share of migrants in their population. This may be so because the size of their population conceals the high level of migrants and vitiates the picture given by the percentage of migrants.

In order to avoid the misleading effect of high resident population on the real position of the district's attractiveness, they have also been studied on the basis of the absolute number of migrants in 1971. Since the data is skewed, median as the central tendency and quartiles and octiles as the indicators of deviation have been used for classifying the districts into different categories: very high, high, medium high, medium low, low and very low (Table 4.2). This analysis, however, does not give a better result, rather it gives an even worse picture of the distribution of migrants. There does not seem to be any relationship between economic condition and distribution of the migrants. Saran, Darbhanga, Muzaffarpur and industrially and commercially most developed 24-Parganas and Midnapore districts fall in the very high category. Similarly the less developed Keonjhar, Kalahandi, Baudh Khondmals and Darjeeling and Cooch Behar, important for commercial farming, are placed in the very low category.

This may also be due to the effect of the varying size of the districts. For example, Calcutta with 752,000 migrants in an area of 104 sq. kilometres is placed in medium high category, while Midnapore, with 14,05,000 migrants in an area of 13,724 sq. kilometres, is placed in very high.

In order to avoid the misleading effect of the area of the district on the regional pattern of migrants, location coefficients (Chapter III,

TABLE 4.2 : **Number of Migrants Born in India, 1971**

Category	Measure of Dispersion	Migrants ('000)	Name of Districts
I (Very High)	Above O_7	Above 1175	Muzaffarpur, Darbhanga, 24-Parganas, Midnapore and Saran.
II (High)	O_7—Q_3	1003—1175	Gaya, Mongher, Purnea Burdwan, Shahabad and Cuttack.
III (Med. High)	M—Q_3	629—1003	Patna, Champaran, Santal, Parganas, Hazaribagh, Ranchi, Dhanbad, Singhbhum, Calcutta, Hooghly, Sambalpur, Ganjam and Puri.
IV (Med. Low)	Q_1—M	410—629	Saharsa, Bhagalpur Palamu, Murshidabad, Howrah, Mayurbhanj, Balasore, Bolangir, Koraput, Jalpaiguri, Birbhum and Bankura.
V (Low)	O_1—Q_1	316—410	Purulia, West Dinajpur, Malda, Nadia, Sundergarh, and Dhenkanal.
VI (Very Low)	Below O_1	Below 316	Keonjhar, Kalahandi, Baudh Khondmals, Darjeeling and Cooch Behar.

p. 81) have been calculated and with the help of median, quartiles and octiles the different districts have been categorized into six groups Fig. 4.2 and Table 4.3).

From this study three distinct zones of high concentration of migrants emerge : the first is the Calcutta-Howrah-Hooghly zone ; the second is centred on Dhanbad and the third is located around Patna. In fact, the Calcutta-Howrah-Hooghly zone forms one compact belt up to Dhanbad through Burdwan district. This is the zone which is very important for industrial, mining and commercial activities. The other zone, the focus of which is Patna, includes Saran, Muzaffarpur, Darbhanga and Mongher forming one compact belt. Patna itself is a great local service centre, while the other areas are agriculturally more developed (Fig. 2.7, 2.8, 2.9, and 2.11). However, they are less urbanized.
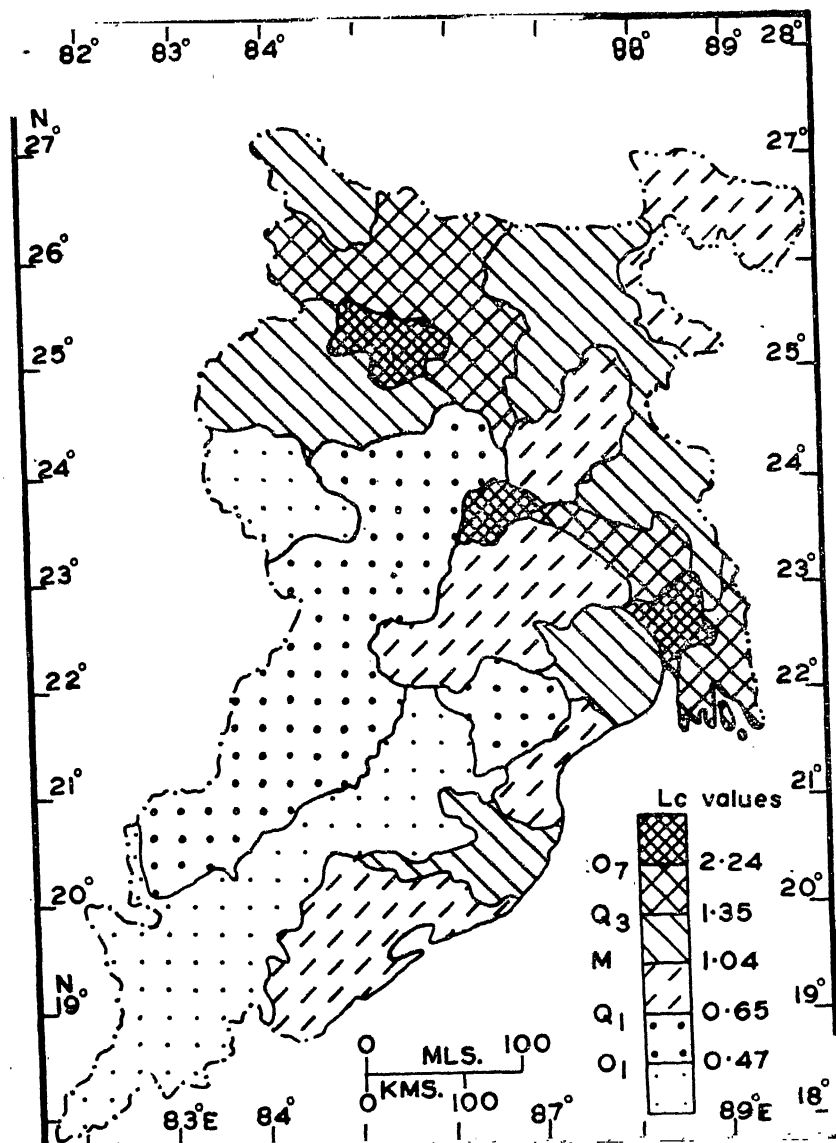
Fig. 4.2 : Bihar, Orissa & W. Bengal—Concentration of Migrants, 1971

The major portions of the Chota Nagpur Plateau and the Orsisa highlands have very low concentration of migrants. Even more developed—industrially and in mining, such as Sundergarh and Sambalpur districts, have lower concentration of migrants. Most of the Utkal Coastal Plain are in the medium category, having slightly higher concentration of migrants than the Orissa Highlands, has the least concentration of migrants (Fig. 4.2).
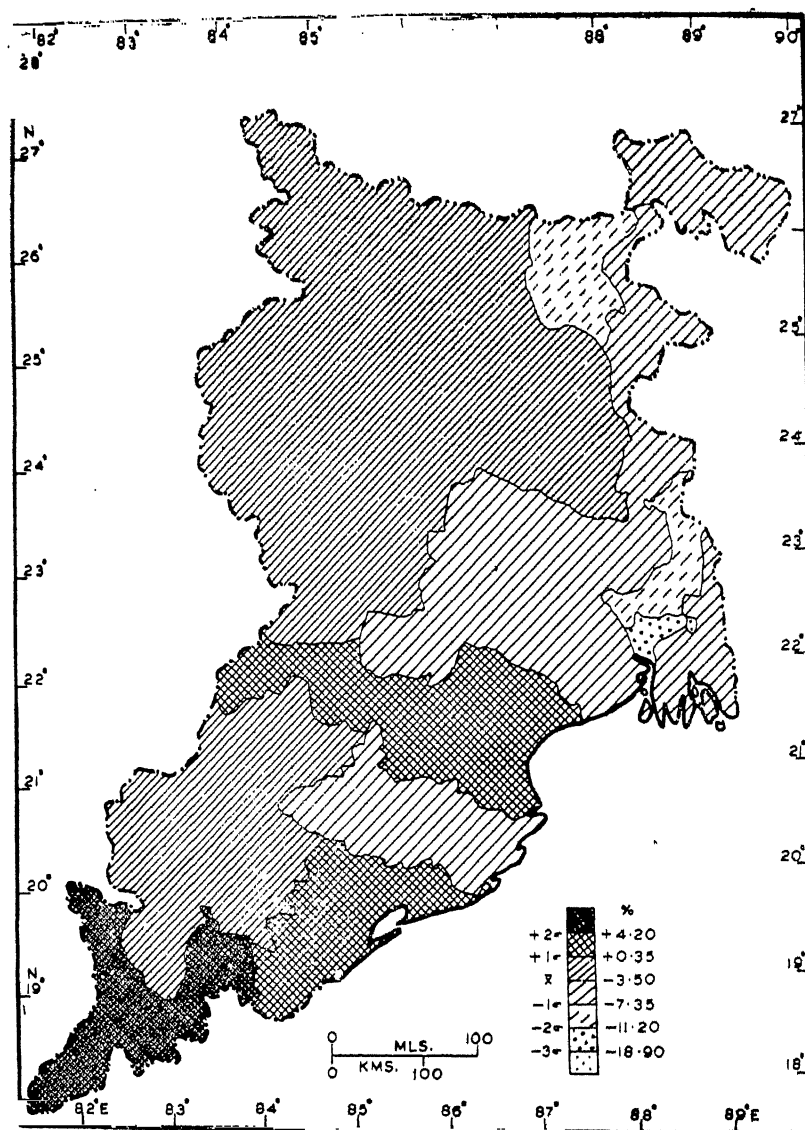
Fig. 4.3 : Bihar, Orissa & W. Bengal—Change in Share of Migrants, 1961-71

The spatial pattern of the concentration of the migrants almost corresponds with the spatial pattern of the density of population (Fig. 2.14). Higher is the density, higher is the concentration of migrants. However, it does not show strong relation with the economic conditions. This is probably because majority of the migrants are females who migrate on account of social reasons.

TABLE 4.3 : **Concentration of Migrants, 1971**

Category	Measure of Dispersion	L_c Value	Name of the Districts
I (Very High)	Above O_7	Above 2.24	Patna, Dhanbad, Hooghly, Howrah, Calcutta.
II (High)	Q_3—O_7	1.35—2.24	Mongher, Darbhanga, Muzaffarpur, Saran, 24-Parganas, and Burdwan.
III (Med. High)	M—Q_3	1.04—1.35	Nadia, Malda, Birbhum, Midnapore, Murshidabad, Cuttack, Gaya, Purnea, Bhagalpur, Shahabad, Saharsa and Champaran.
IV (Med. Low)	Q_1—M	0.65—1.04	Darjeeling, Singhbhum; Ganjam, Santal Parganas, Cooch Behar, Purulia, Jalpaiguri, Bankura, West Dinajpur, Puri, Balasore.
V (Low)	O_1—Q_1	0.47—0.65	Sundergarh, Mayurbhanj, Sambalpur, Bolangir, Ranchi, and Hazaribagh.
VI (Very Low)	Below O_1	Below 0.47	Baudh Khondmals, Koraput, Kalahandi, Dhenkanal, Keonjhar and Palamu.

It is obvious from the above studies that industrial and commercial areas, and the areas of plantation agriculture, viz., Darjeeling and Cooch Behar, etc., are notable for higher immigration. In contrast, the plain areas of Bihar and those plateau areas of Bihar, Orissa and West Bengal, which are devoid of industrial development, are the areas of low immigration. The study of the pattern of change in migration is expected to further reveal the causal factors.

Regional Pattern of Change in Migration

On an average the share of migrants in total population has decreased by 3.50 per cent during 1961-71. However, the change varies from +4.46 per cent in Koraput to —19.21 per cent in Calcutta. This clearly indicates that the immobile population has increased at a higher rate than the mobile persons. In Bihar and West Bengal, all the districts have recorded decline in the share of mobile population while 50 per cent of the districts

of Orissa have recorded a positive change in the share of mobile popula-
tion. This is probably due to industrialization at a later stage in some
districts of Orissa, particularly in Sundergarh, Keonjhar, Mayurbhanj,
Koraput, Ganjam and Puri.

From the point of view of change in the share of mobile population
the area under study has been divided into seven categories on the basis of
mean and standard deviation : very high, high, medium high, medium low,
low, very low and extremely low (Fig. 4.3, Table 4.4).

TABLE 4.4 : **Change in Share of Migrants, 1961-71**

Category	Measure of Dispersion	Percentage Change	Name of Districts
I (Very High)	Above $+2\sigma$	Above $+4.20$	Koraput.
II (High)	$+1\sigma$ to 2σ	$+0.35$ to 4.20	Puri, Ganjam, Mayurbhanj, Sudergarh and Keonjhar.
III (Med. High)	$\overline{X}$ to 1σ	-3.50 to 0.35	Patna, Gaya, Shahabad, Saran, Champaran, Muzaffarpur, Darbhanga, Mongher, Bhagalpur, Santal Parganas, Palamu, Hazaribagh, Ranchi, Sambalpur, Baudh Khondmals, Bolangir, Kalahandi and Birbhum.
IV (Med. Low)	-1σ to $\overline{X}$	-7.35 to -3.50	Saharsa, Dhanbad, Singhbhum, Darjeeling, Cooch Behar, Jalpaiguri, W. Dinajpur, Malda, Murshidabad, Burdwan, Midnapore, Bankura, Purulia, 24-Parganas and Dhenkanal.
V (Low)	-2σ to -1σ	-11.20 to -7.35	Purnea, Nadia and Hooghly.
VI (Very Low)	-3σ to -2σ	-15.05 to -11.20	Howrah.
VII (Extremely Low)	Below -4σ	Below -18.90	Calcutta.

The district which experienced the highest positive change in the
share of migrants during 1961-71 is Koraput followed by Sundergarh, Puri,
Ganjam, Keonjhar and Mayurbhanj under high category. In comparison

with them Calcutta and Howrah recorded the highest negative changes in the share of migrants (in extremely low and very low categories respectively). Purnea, Nadia and Hooghly districts are placed in the low category (with change between −11.20 and −7.35 per cent).

Spatial Pattern of Change in Migrants

The highest positive change in the migrants during 1961-71 has occurred in the south-western portion of the study area in the Orissa Highlands (Koraput) (Fig. 4.3). The change of the next order have two distinct zones : one in the south-western part of the Utkal Coastal Plain including Puri and Ganjam ; and the other patch extend from the Utkal coastal plains across the Orissa Highlands up to the western boundary. This zone comprises Balasore, Mayurbhanj, Keonjhar and Sundergarh districts. The major portion of the Bihar Plain, the Chota Nagpur Plateau and the Orissa Highlands recorded medium high change in the share of total migrants while the industrially and commercially the most developed (Fig. 2.13) and the most densely settled areas (Fig. 2.14) around Calcutta experienced the lowest change in the percentage of migrants. Most of the Lower Ganga Plain including the Himalayan tract with plantation farming ; western portion of the Bihar Plain ; central part of the Utkal coastal plain ; and north-eastern and south-eastern section of the Orissa Highlands and the Chota Nagpur Plateau respectively have recorded lower change in the percentage of migrants during 1961-71 decade.

There seems to be an inverse relation between the share of migrants in total population in 1971 and a change in the share of the mobile population during 1961-71. The areas showing higher share of mobile population have recorded a higher decline in this respect and vice-versa, of course with a few exceptions, viz., in Purnea and Saharsa, and Sundergarh. They had a low share of mobile population in 1971 and still have recorded one of the highest decline in the share of mobile population. This may be due to higher immigration in early years (1960s) probably on account of the taming of the Kosi and eradication of malaria and later higher natural increase in the local population. Sundergarh is newly developed industrial (Fig. 2.13) and mining region (Fig. 2.12) with sparse population (Fig. 2.14), but it has higher urbanization (Fig. 2.16).

The study of the change in percentage share of mobile population may not reveal the real cause of change or the process on account of the weakness of percentage as a measure of change (as discussed earlier). Hence the study of the regional pattern of increase/decrease in migrants has been made in the following paragraphs.

Regional Pattern of Increase/Decrease of Migrants, 1961-71

On an average the number of migrants in 1971 increased by 11.83 per cent over that in 1961. The figure varies from a decline of 31.67 per cent
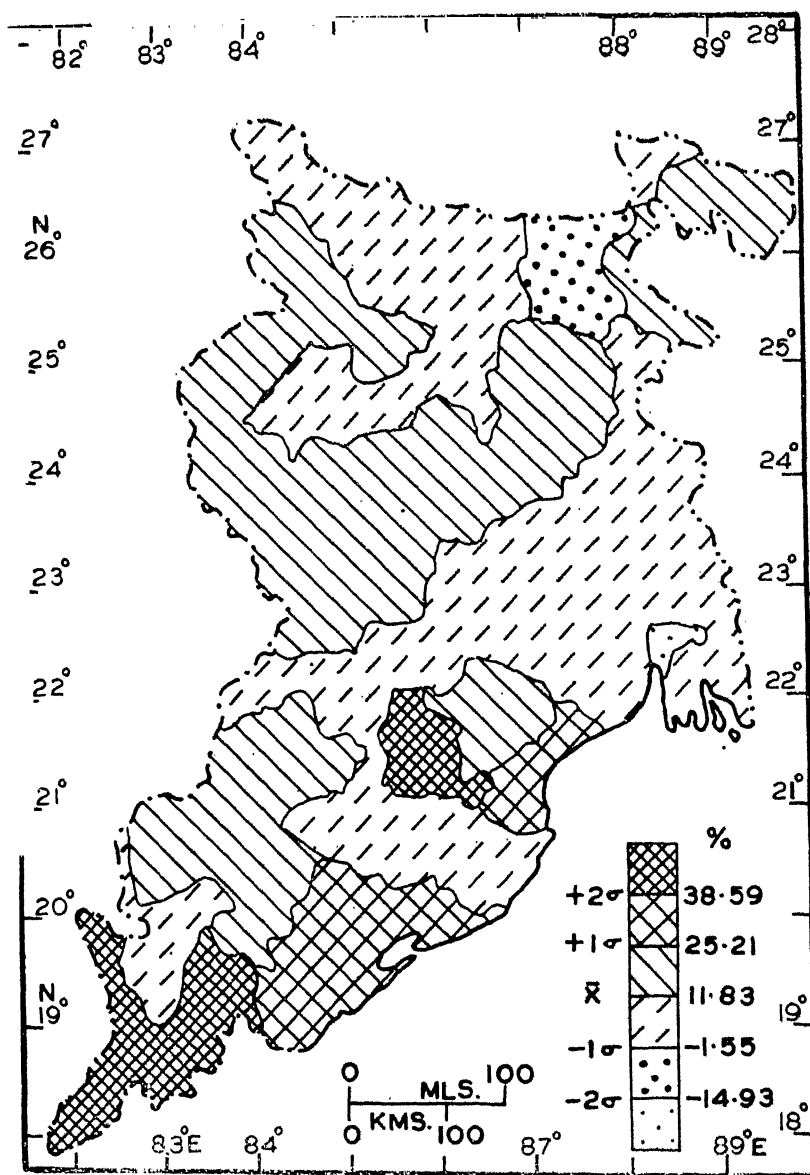
Fig. 4.4 : Bihar, Orissa & W. Bengal—Percentage Increase in Number of
Migrants, 1961-71

in Calcutta to an increase of 57.45 per cent in Koraput district. Only
three districts recorded a decline, namely, Calcutta (−31.67%,) Howrah
(−20.33%) and Purnea (−3.08%). Others recorded an increase in the
number of migrants over the 1961 figures, which varies from 2.50 per
cent in Kalahandi to 57.45 per cent in Koraput. The study area can again

be grouped into six classes on the basis of mean and standard deviation :
very high, high, medium high, medium low, low and very low (Table 4.5,
Fig. 4.4)

TABLE 4.5 : **Percentage Increase in Migrants, 1961-71**

Category	Measure of Dispersion	Percentage Increase	Name of Districts
I (Very High)	Above +2σ	Above 38.59	Koraput and Keonjhar.
II (High)	+1σ to 2σ	25.21—38.59	Puri, Ganjam and Balasore.
III (Med. High)	$\bar{X}$ to 1σ	11.83—25.21	Patna, Shahabad, Saran, Bhagalpur, Santal Parganas, Palamu, Hazaribagh, Ranchi, Dhanbad, Jalpaiguri, Cooch Behar, West Dinajpur, Sambalpur, Mayurbhanj, Baudh Khondmals, and Bolangir.
IV (Med. Low)	— 1σ to $\bar{X}$	—1.55 to +11.83	Gaya, Champaran, Muzaffarpur, Darbhanga, Mongher, Saharsa, Singhbhum, Darjeeling, Malda, Murshidabad, Nadia, 24-Parganas, Hooghly, Burdwan, Birbhum, Bankura, Midnapore, Purulia, Sundergarh, Cuttack, Dhenkanal and Kalahandi.
V (Low)	—2σ to —1σ	—14.93 to —1.55	Purnea.
VI (Very Low)	Below —2σ	Below —14.93	Howrah and Calcutta.

Fig. 4.4 reveals that Koraput and Keonjhar districts of Orissa record-
ed the highest increase (above 38.58 per cent, above +2 S.D.) in the
number of the total migrants during 1961-71, followed by Puri, Ganjam
and Balasore, under the high category. As compared to them Calcutta
and Howrah (under the very low category) experienced the highest decline
in the number of migrants over the period.

Increase in the number of migrants (Fig. 4.4) exhibit almost the
similar spatial pattern with some variations. The zones of the highest

increase is centred on the southern tip (Koraput) and the central portion (Keonjhar) of the Orissa Highlands. The next category (high) of increase occurred in the central and southern part of the Utkal coastal plain (Fig. 2.4). Major portions of the Bihar Plain, particularly North Bihar Plain, the Lower Ganga Plain and the south-eastern and north-eastern portion of the Chota Nagpur and the Orissa Highlands have medium to low increase in the number of migrants during 1961-71. The only exception is the Patna, Saran and Shahabad forming one compact zone together with the western and north-eastern portion of the Chota Nagpur Plateau including Palamu, Ranchi, Hazaribagh and Santal Parganas, which have experienced the medium high increase. Bolangir, Sundergarh, Dhenkanal and Cuttack in the south-western, north-western and central portion respectively of the Orissa Highlands and the latter in the Utkal Coastal Plain, also have a medium low increase.

The lowest increase was recorded by the Calcutta zone including Calcutta, Howrah and Hooghly districts of the Delta proper of the Lower Ganga Plain, while rest of the Chota Nagpur Plateau and the Orissa Highlands experienced slightly higher increase (medium low) in the number of migrants during 1961-71 decade. Jalpaiguri-Cooch Behar zone recorded the medium high increase.

Fig. 4.4 clearly indicates that one of the highest increase has been recorded in plateau regions of the area under study. All the plain districts, except Patna, Shahabad and Saran districts of Bihar, West Dinajpur district of West Bengal and Puri and Balasore districts of Orissa, experienced lower increase (in most of the cases decrease) in the number of migrants. This may be on account of saturation of the employment market in the already developed areas.

The above study, makes it clear to some extent that there is inverse relationship between the share of mobile population in 1971 (Fig. 4.1) and increase in the number of migrants in 1971 (Fig. 4.4) over that of 1961.

Sex Composition of the Migrants

The sex composition of the migrants is expected to throw better light on the causes and process of migration because the factors leading to migration of males and females are quite different, particularly in India. The Males generally migrate on account of economic causes while the females change their place of residence mostly due to social causes (e.g., marriage migration).[1]

So far as the males and females in the total migrants are concerned, the share of the former is very small. On an average the males account form only 28.34 per cent of the total migrants and the rest (71.66%) is made up by females. The share of males varies from 6.90 per cent in Saran to 76.29 per cent in Calcutta. For discerning regional pattern of male
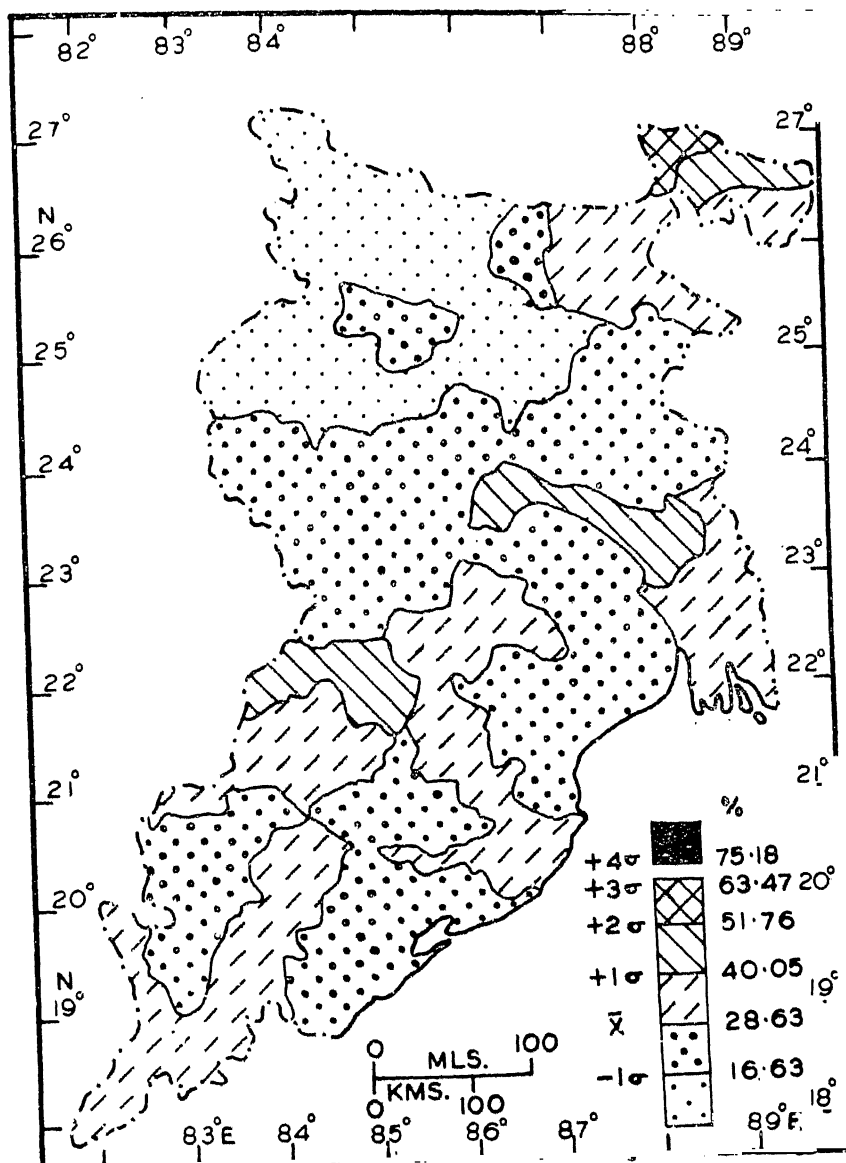
Fig. 4.5 : Bihar, Orissa & W. Bengal—Share of Male Migrants to Total
Migrants, 1971

migrants in 1971 all the 46 districts have been classified with the help of
mean and standard deviation (Fig. 4.5 and Table 4.6).

It is obvious from Figure 4.5 that Calcutta is the most attractive
district for the male migrants, followed by Darjeeling, Jalpaiguri, Burdwan,

TABLE 4 6 : **Share of Male Migrants to Total Migrants, 1971**

Category	Measure of Dispersion	Percentage of male migrants	Name of Districts
I (Extremely High)	Above $+4\sigma$	Above 75.18	Calcutta.
II (Very High)	$+ 2\sigma$ to 3σ	51.76—63.47	Darjeeling.
III (High)	$+1\sigma$ to 2σ	40.05—51.76	Jalpaiguri, Burdwan, Dhanbad and Sundergarh.
IV (Med. High)	$\bar{X}$ to 1σ	28.34—40.05	Cooch, Behar, West Dinajpur, Nadia, Hooghly, Howrah, 24-Parganas, Purnea, Singhbhum, Sambalpur, Keonjhar, Cuttack, Baudh Khondmals and Koraput.
V (Med. Low)	-1σ to $\bar{X}$	16.63—28.34	Patna, Saharsa, Palamu, Hazaribagh, Ranchi, Santal Parganas, Malda, Murshidabad, Birbhum, Purulia, Bankura, Midnapore, Mayurbhanj, Balasore, Dhenkanal, Bolangir. Kalahandi, Ganjam and Puri.
VI (Low)	Below -1σ	Below 16.63	Gaya, Shahabad, Saran, Champaran, Muzaffarpur, Darbhanga, Mongher and Bhagalpur.

Dhanbad and Sundergarh. All these areas are economically more attractive either on account of industrial and/or commercial activities and mining or are areas of commercial agriculture, e.g., Darjeeling and Jalpaiguri. On the other hand, the overcrowded agricultural rural areas of Bihar Plain (except Patna), which are devoid of development in modern sectors of economy, are noted for the least share of male immigrants in 1971.

For discussing the spatial pattern of the concentration of the male migrants, location coefficients have been calculated and the districts have been classified with the help of median, quartiles and octiles (Table 4.7, Fig. 4.6).

<p style="text-align:center">TABLE 4.7 : **Concentration of Male Migrants, 1971**</p>

Category	Measure of Dispersion	L_o value	Name of Districts
I (Very High)	Above O_7	Above 2.50	Calcutta, Howrah, Hooghly, Burdwan, 24 Parganas and Dhanbad.
II (High)	$Q_3 - O_7$	1.23—2.50	Patna, Jalpaiguri, Darjeeling, Purnea, Nadia and Murshidabad.
III (Med. High)	$M - Q_3$	0.76—1.23	Cuttack, Sambalpur, Puri, Birbhum, West Dinajpur, Midnapore, Cooch Behar, Malda, Saharsa, Singhbhum and Muzaffarpur.
IV (Med. Low)	$Q_1 - M$	0.60—0.76	Balasore, Sundergarh, Ganjam, Darbhanga, Gaya, Champaran, Bhagalpur, Shahabad, Mongher, Saran, Purulia and Bankura.
V (Low)	$O_1 - Q_1$	0.47—0.60	Keonjhar, Bolangir, Mayurbhanj, Hazaribagh, Santal Parganas and Ranchi.
VI (Very Low)	Below O_1	Below 0.47	Koraput, Dhenkanal, Baudh Khondmals, Kalahandi and Palamu.

Spatial Pattern of the Distribution of Male Migrants

It is obvious from this study (Fig. 4.5) that Calcutta is the greatest centre of attraction for the male migrants. The areas of high share of male migrants form three distinct zones : one centred on Calcutta and extending through Burdwan to Dhanbad ; the other zone includes Darjeeling and Jalpaiguri ; and the third zone comprise north-western portion of the Orissa Highlands (Sundergarh district). The first-two are traditionally developed areas, the former on account of industrial, commercial and mining activities leading to one of the highest urbanization (Fig. 2.16) and the latter on account of commercial farming, tourism and settling up of a number of industries. The third zone is a newly developed industrial and mining centres. However, the adjoining regions around these centres have medium low to medium high share of male migrants.

Most of the Bihar Plain around Patna (excluding Patna) form one compact patch of the lowest percentage of male migrants (Fig. 4.4). Only

north-eastern portion (including Saharsa and Purnea), which is comparatively sparsely populated, has higher share of male migrants. Most of the Chota Nagpur Plateau and the Orissa Highland, excluding those in the high category, have medium high and medium low categories of male migrants. The most densely settled area excluding only those which are industrially or otherwise developed, have the lowest percentage of male migrants.

Patna, Saharsa and Purnea have comparatively higher share of male migrants, the former on account of its attraction for the services it provides, the latter two on account of later agricultural development after taming the Kosi and with relatively sparse population.

Spatial Pattern of the Concentration of Male Migrants

Fig. 4.6 shows that the areas of very high concentration of male migrants form one big zone including the Delta proper of the Lower Ganga Plain and the south-eastern part of the Chota Nagpur Plateau, around Calcutta consisting of Howrah, Hooghly, 24-Parganas, Burdwan and Dhanbad districts. These are traditionally the most developed section of the study area. The areas of the next order of concentration forms three different patches : one including Darjeeling, Jalpaiguri and Purnea in the north-eastern corner of the study area ; and the other Patna. The third (Nadia and Murshidabad) near the most attractive zone. The medium high category of concentration occur in the areas adjoining the most attractive zone (Birbhum, Malda, West Dinajpur and Cooch Behar ; Saharsa and Muzaffarpur near Purnea and Patna respectively. Besides there are three scattered patches in the Chota Nagpur Plateau and its adjoining Lower Ganga Plain, the Utkal Coastal Plain and the Orissa Highlands. The first includes Midnapore and Singhbhum, the second consists of Cuttack and Puri and the third comprises Sambalpur district.

. The areas of the least concentration of migrants form two zones : the first in the south-central Orissa Highlands and the second include Palamu district of Bihar. The medium low concentration is found in the southern and eastern portion of the Chota Nagpur Plateau (including Ranchi, Hazaribagh and Santal Parganas, and northern and west-central portion of the Orissa Highlands in Bolangir and Mayurbhanj districts. The medium high concentration occur in the north-western Bihar Plain excluding Patna and Muzaffarpur ; Purulia and Bankura, just east of the mineralized zone ; Sundergarh of the north-west Orissa Highlands and Balasore and Ganjam in northern and southern parts of the Utkal coastal plain respectively.

The above studies indicate that the areas having a higher share of male migrants are those which are industrially developed (Fig. 2.13) or have commercial agriculture, attracting immigrants on account of
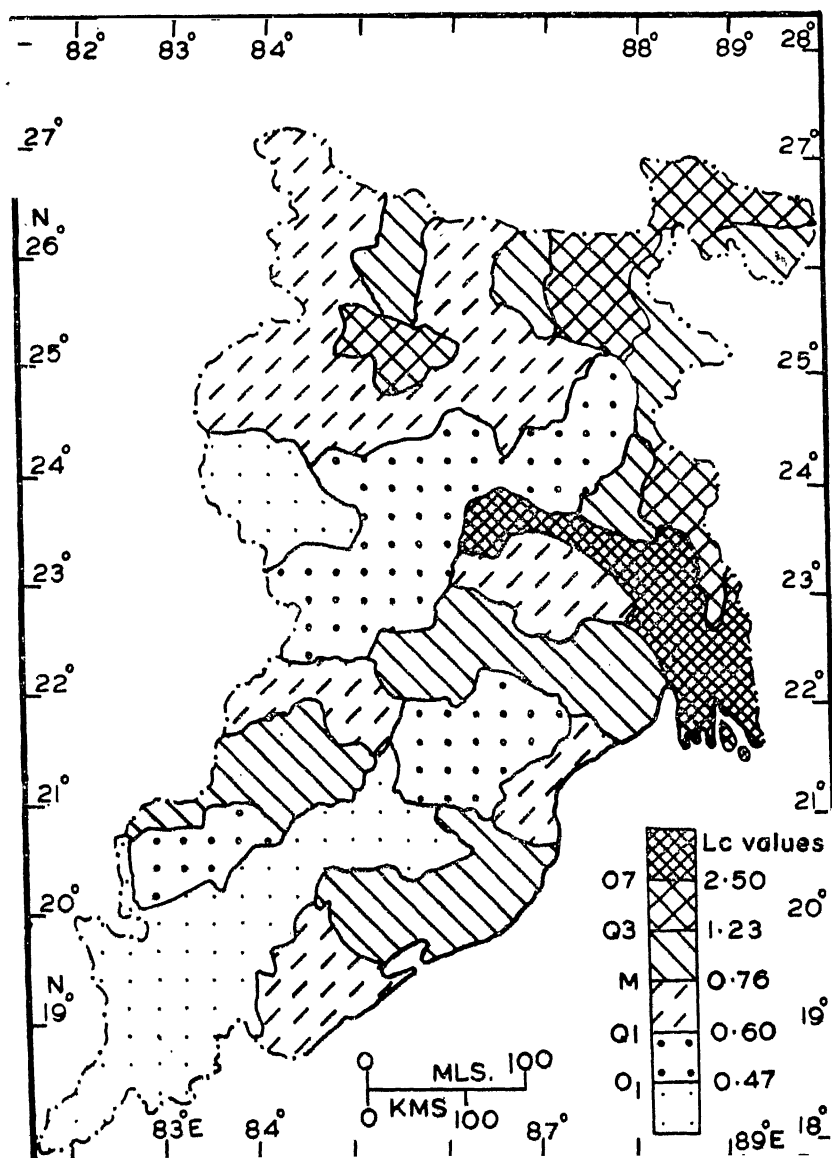
Fig. 4.6 : Bihar, Orissa & W. Bengal—Concentration of Male Migrants, 1971

economic causes. The plain areas of Bihar with one of the densest population (Fig. 2.14) and the greater part of the Orissa Highlands have the lowest share of male immigrants. This is because these areas are economically unattractive and most of the migration is due to social reasons.
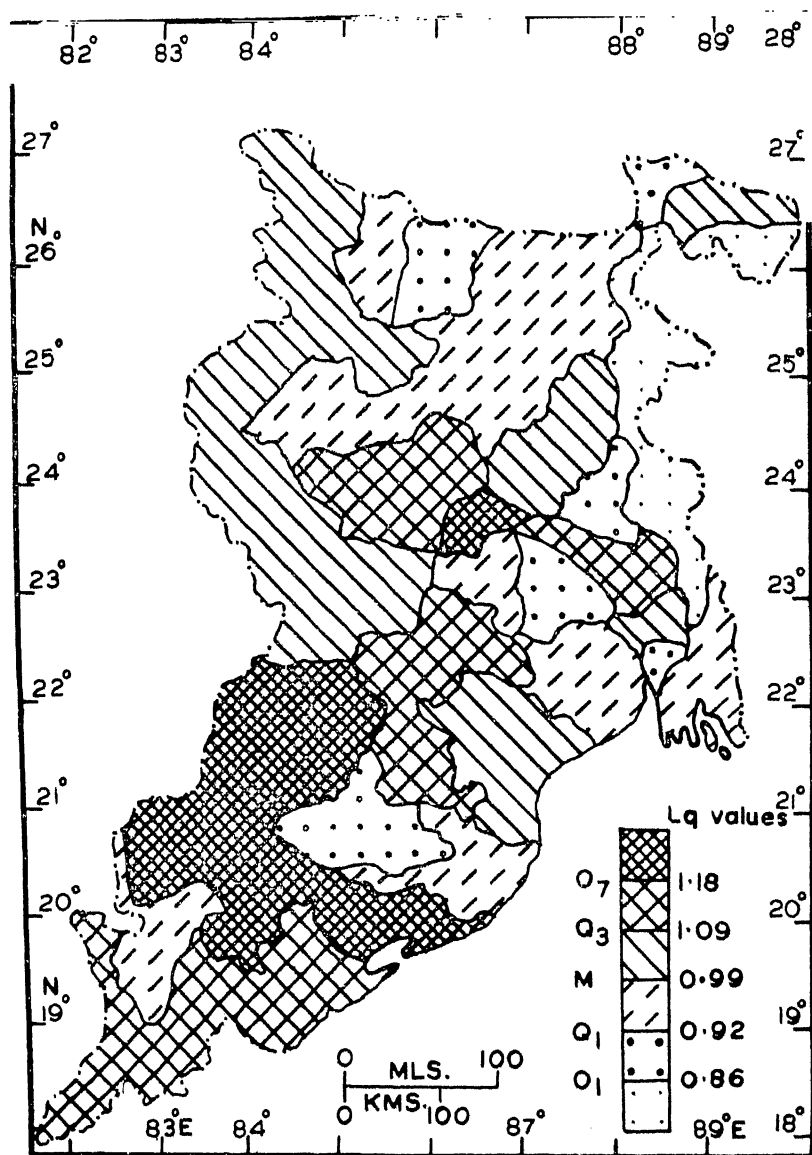
Fig. 4.7 : Bihar, Orissa & W. Bengal—Relation between Migrants and Total Population, 1971

When the location coefficients for total migrants and male migrants are compared it becomes obvious that total migrants are more uniformly distributed than male migrants. The values of octiles one and seven are 1.18 and 0.86 respectively for the former while they are 2.50 and 0.47 for the latter. This fact is also exemplified by Fig. 4.9 in which total migrants and male migrants have been plotted on a Lorenz curve

(see p. 82) to show their nature of distribution. It is due to the fact that total migrants include female migrant as their largest share and since female migration is usually associated with marriage, it is expected that total migration will be in proportion to their share in the total population. For testing this hypothesis, location quotients for total population and total migrants on the one hand, and total population and male migrants on the
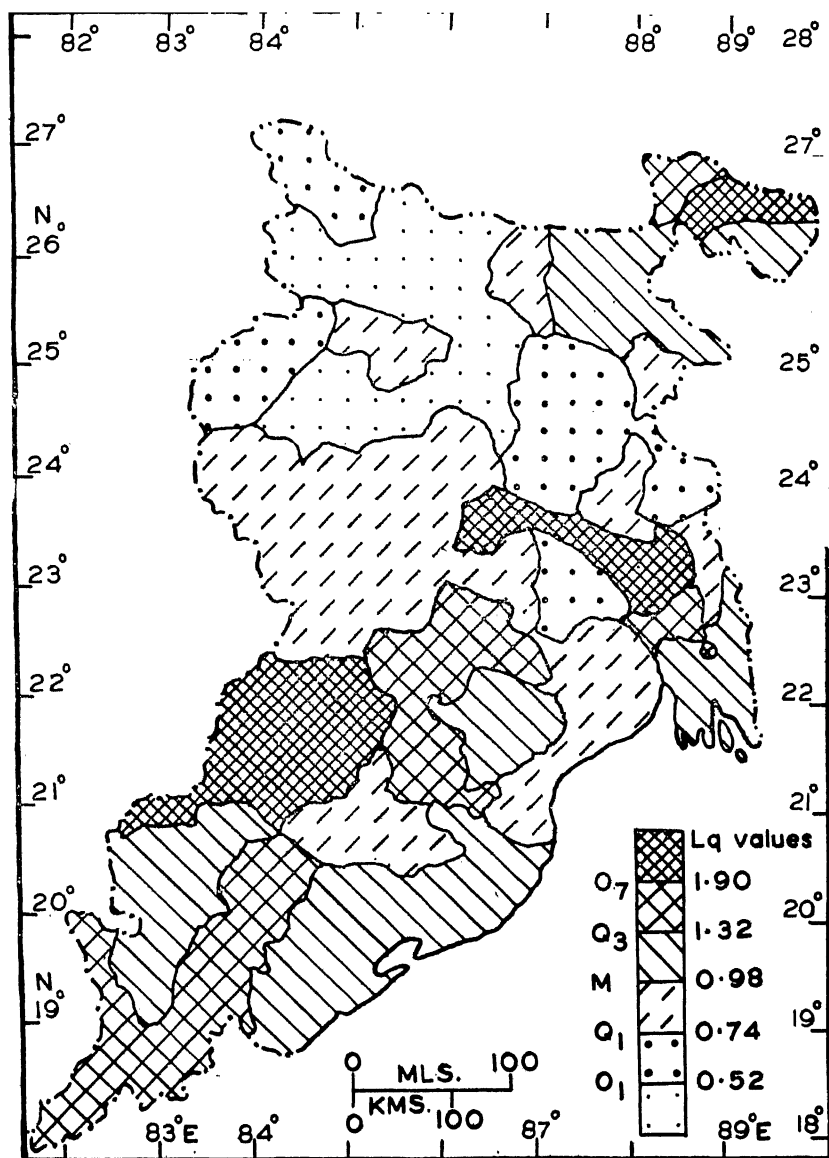
Fig. 4.8 : Bihar, Orissa & W. Bengal—Relation between Male Migrants and Total Population, 1971

other have been calculated.   The two L_{qs} prove the hypothesis (Tables 4.8 and 4.9 and Figs. 4.7 and 4.8).   The values for total migrants are very close to one and vary only between 0.71 in Murshidabad and 1.61 in Dhanbad.   The L_{qs} for male migrant vary greatly from 0.27 in Saran to 2.88 in Calcutta.   This indicates that male migrants do not show a close relationship with the magnitude of population. Obviously it is more a result of disparity in economic development and employment opportunities.

The L_{qs} show more or less a similar regional pattern as that of the percentages of total and male migrants.   The sparsely populated districts of Orissa are the only exceptions.   They have a lower share of total and male migrants, but higher L_q values (Tables 4.1 and 4.8, Figs. 4.1 and 4.7 and Tables 4.6 and 4.9, Figs. 4.5 and 4.8).

Regional Pattern of Change in Male Migrants
The pattern of change in the share of male migrant would further reveal the processes at work.   On an average the share of male migrants
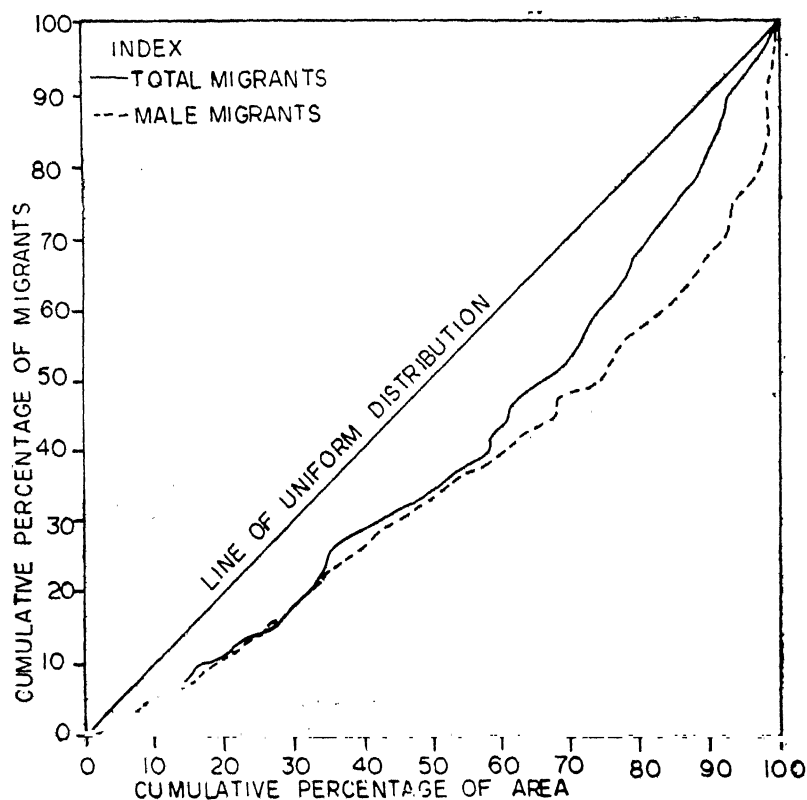
Fig. 4.9 : Distribution Pattern of Total and Male Migrants on Lorenz Curve, 1971

TABLE 4.8 : **Relationship between Total Migrants and Total Population, 1971**

Category	Measure of Dispersion	L_q of total migrants and total Population	Name of Districts
I (Very High)	Above O_7	Above 1.18	Dhanbad, Sambalpur, Baudh Khondmals, Puri and Bolangir,
II (High)	Q_3—O_7	1.09—1.18	Keonjhar, Koraput, Ganjam, Hazaribagh, Singhbhum and Burdwan.
III (Med. High)	M—Q_3	0.99—1.09	Mayurbhanj, Balasore, Shahabad, Ranchi, Saran, Palamu, Patna, Champaran, Santal Parganas, Jalpaiguri and Hooghly.
IV (Med. Low)	Q_1—M	0.92—0.99	Cuttack, Kalahandi, Mongher, Saharsa, Bhagalpur, Muzaffarpur, Purnea, Gaya, Calcutta, Purulia, Midnapore, 24-Parganas.
V (Low)	O_1—Q_1	0.86—0.92	Darbhanga, Dhenkanal, Bankura, Howrah, Birbhum, Darjeeling.
VI (Very Low)	Below O_1	Below 0.86	West Dinajpur, Malda, Murshidabad, Nadia and Cooch Behar.

has slightly increased (0.59%) during the period 1961-71. In fact it varies from —17.84% in Bhagalpur to +14.55% in Murshidabad. Most of the districts of Bihar have experienced a negative change in the share of male migrants except Hazaribagh, Ranchi and Dhanbad, which have recorded an increase in the share from 2.20 to 11.79 per cent. All the districts of West Bengal have also recorded a decline in its share except Murshidabad, Calcutta, Birbhum, Midnapore and Purulia. However, all the districts of Orissa have experienced a positive change in the share of male migrants. This indicates either new development in the recent years or economic development in later years than the earlier ones as in the case of some districts of Orissa,

The districts of the study area can again be categorized into six groups on the basis of median quartiles and octiles : very high, high, medium high, medium low, low and very low (Table 4.10, Fig. 4.10). Murshidabad, Dhanbad, Sambalpur, Cuttack and Sundergarh fall in the very high category, followed by Baudh Khondmals, Keonjhar, Koraput,
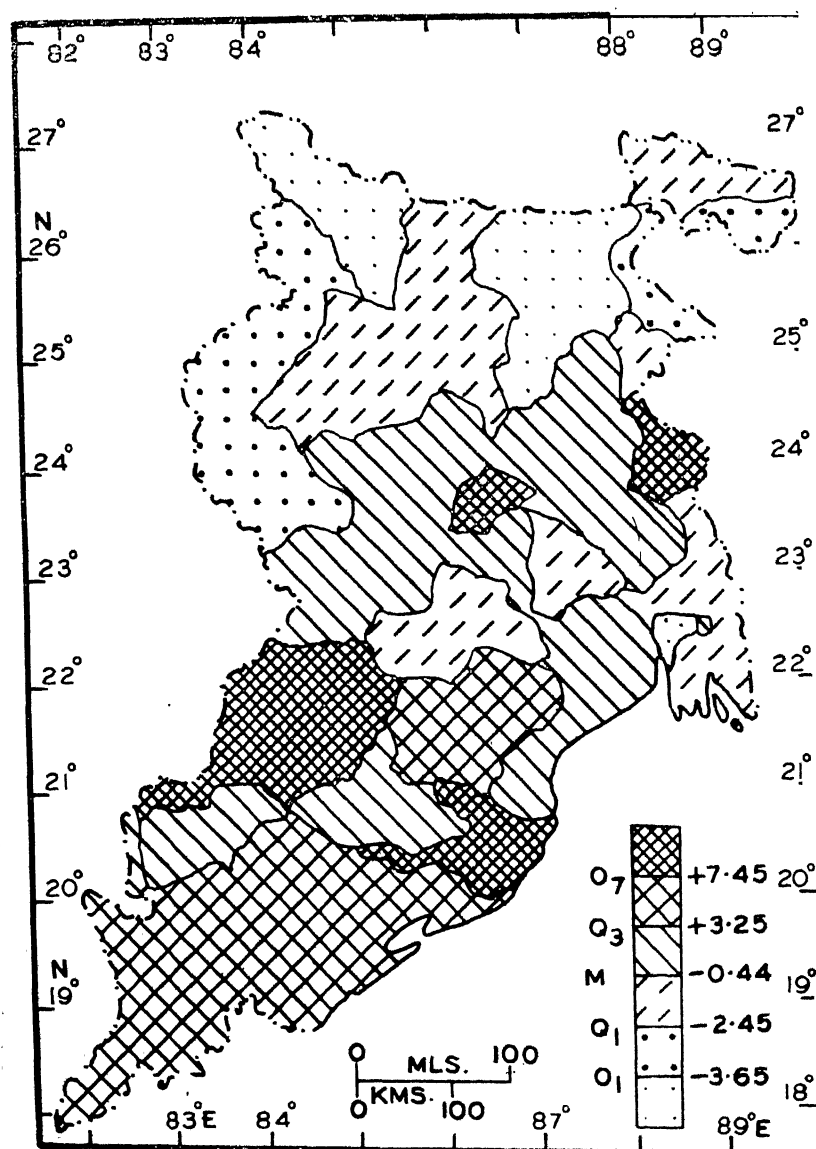
Fig. 4.10 : Bihar, Orissa & W. Bengal—Change in Share of Male Migrants, 1961-71

TABLE 4.9 : **Relationship between Male Migrants and Total Population, 1971**

Category	Measure of Dispersion	L_q Value	Name of Districts
I (Very High)	Above O_7	Above 1.90	Dhanbad, Calcutta, Sambalpur, Sundergarh, Burdwan and Jalpaiguri.
II (High)	$Q_3 - O_7$	1.32 — 1.90	Darjeeling, Hooghly, Koraput, Keonjhar, Baudh Khondmals and Singhbhum.
III (Med. High)	$M - Q_3$	0.98 — 1.32	24-Parganas, Howrah, West Dinajpur, Cooch Behar, Ganjam, Bolangir, Mayurbhanj, Cuttack, Puri, Kalahandi and Purnea.
IV (Med. Low)	$Q_1 - M$	0.74 — 0.98	Ranchi, Hazaribagh, Patna, Palamu, Saharsa, Birbhum, Purulia, Midnapore, Nadia, Malda Dhenkanal and Balasore.
V (Low)	$O_1 - Q_1$	0.52 — 0.74	Santal Parganas, Shahabad, Champaran, Bhagalpur, Murshidabad and Bankura.
VI (Very Low)	Below O_1	Below 0.52	Gaya, Mongher, Darbhanga, Muzaffarpur and Saran.

Puri, Ganjam and Mayurbhanj in the high category. In contrast, the districts of Saran, West Dinajpur, Shahabad, Palamu and Cooch Behar experienced low change followed by Muzaffarpur, Champaran, Purnea, Howrah, Saharsa and Bhagalpur in the very low category.

The higher positive change in the share of male migrants has been recorded in comparatively sparsely populated and newly developed (industrial and mining activities) districts of Orissa (Fig. 4.11). Murshidabad in West Bengal and Dhanbad in Bihar are the only exceptions and have experienced maximum positive change in the share of male migrants during 1961-71. Dhanbad is industrially and commercially one of the most developed districts and is an area of the highest concentration of the mining. The agricultural areas of Bihar Plain and West Bengal Plain, particularly North Bihar Plain experienced one of the lowest change (rather the highest negative change) in the share of male migrants. Moreover,

TABLE 4.10 : **Change in Share of Male Migrants, 1961-71**

Category	Measure of Dispersion	Percentage Change	Name of Districts
I (Very High)	Above O_7	Above $+7.45$	Murshidabad, Dhanbad, Sambalpur, Cuttack and Sundergarh.
II (High)	$Q_3 - O_7$	$+3.25$ to $+7.45$	Baudh Khondmals, Keonjhar, Koraput, Puri, Ganjam and Mayurbhanj.
III (Med. High)	$M - Q_3$	-0.44 to $+3.25$	Kalahandi, Dhenkanal, Bolangir, Balasore, Ranchi, Santal Parganas Hazaribagh, Calcutta, Purulia, Midnapore, Birbhum and Burdwan
IV (Med. Low)	$Q_1 - M$	-2.45 to -0.44	Bankura, Darjeeling, Malda, Jalpaiguri, Nadia, Hooghly, 24-Parganas, Patna, Singhbhum, Gaya, Darbhanga and Mongher.
V (Low)	$O_1 - Q_1$	-3.65 to -2.45	Saran, Shahabad, Palamu, West Dinajpur and Cooch Behar.
VI (Very Low)	Below O_1	Below -3.65	Muzaffarpur, Champaran, Purnea, Saharsa, Bhagalpur and Howrah.

the industrial and commercial hub around Calcutta has also recorded one of the highest negative changes in the share of male migrants during 1961-71. Calcutta seems to have reached a saturation point in the matter of employment opportunities.[2]

The regional pattern of increase in the number of male migrants would further clarify the process. All the plateau districts of Bihar (Table 4.11 and Fig. 4.11) experienced an increase in the number of male migrants, the highest being in Ranchi followed by Hazaribagh and Dhanbad. Contrary to them all the plain districts of Bihar have recorded a decrease in the number of male migrants, the highest being in Bhagalpur followed by Saharsa, and Muzaffarpur. All the districts of West Bengal and Orissa, except Howrah, Calcutta and Hooghly, experienced an increase in the number of male migrants,

The districts of the study area have been classified on the basis of increase in the number of male migrants with the help of mean and standard deviation (Table 4.11, Fig. 4.11). Ganjam, Cuttack, Puri, Koraput, Sambalpur and Sundergarh top among other districts with a very high increase (above 580 male migrants). As compared to them Purnea, Saharsa, Bhagalpur, Calcutta and Howrah recorded heavy decline in the number of male migrants (above —878).

TABLE 4.11 : **Change in the Number of Male Migrants, 1961-71**

Category	Measure of Dispersion	Increase in Male Migrants ('000)	Name of Districts
I (Very High)	Above +2	1066	Cuttack.
II (High)	+1 to +2	580 — 1066	Koraput, Ganjam, Puri, Sundergarh and Sambalpur.
III (Med. High)	$\bar{X}$ to 1	94 — 580	Santal Parganas, Hazaribagh, Ranchi, Dhanbad, Singhbhum, Jalpaiguri, Cooch Behar, West Dinajpur, Burdwan, Birbhum, Midnapore, Keonjhar, Mayurbhanj Balasore, Dhenkanal, Baudh Khondmals, Bolangir, Kalahandi.
IV (Med. Low)	—1 to $\bar{X}$	—392 to 94	Patna, Gaya, Shahabad, Saran, Champaran, Muzaffarpur, Darbhanga, Mongher, Palamu, Darjeeling, Malda, Hooghly, Bankura, Nadia, 24-Parganas, Purulia and Murshidabad.
V (Low)	—2 to —1	—878 to —392	Saharsa, Purnea and Howrah.
VI (Very Low)	Below —2	More than —878	Bhagalpur and Calcutta.

A higher increase in the number of male migrants has occurred in the sparsely populated regions of the study area, the highest being in Orissa in Cuttack district, followed by Koraput, Ganjam, Puri, Sundergarh and Sambalpur.

Location coefficients for increase/decrease in the number of male migrants during 1961-71 decade still give a good picture and reveal the

concentration of increase/decrease in male migrants (Table 4.12, Fig. 4.12). Dhanbad, Burdwan, Sundergarh, Sambalpur, Keonjhar and Puri districts top the list with very high L_c values (above $+5.01$), followed by Jalpaiguri, Midnapore, Ganjam, Balasore and Koraput. On the other hand Hooghly, Patna, Saran, Champaran, Darbhanga and Muzaffarpur districts have low L_c values with Calcutta, Howrah, Bhagalpur, Saharsa and Cuttack in the very low category.
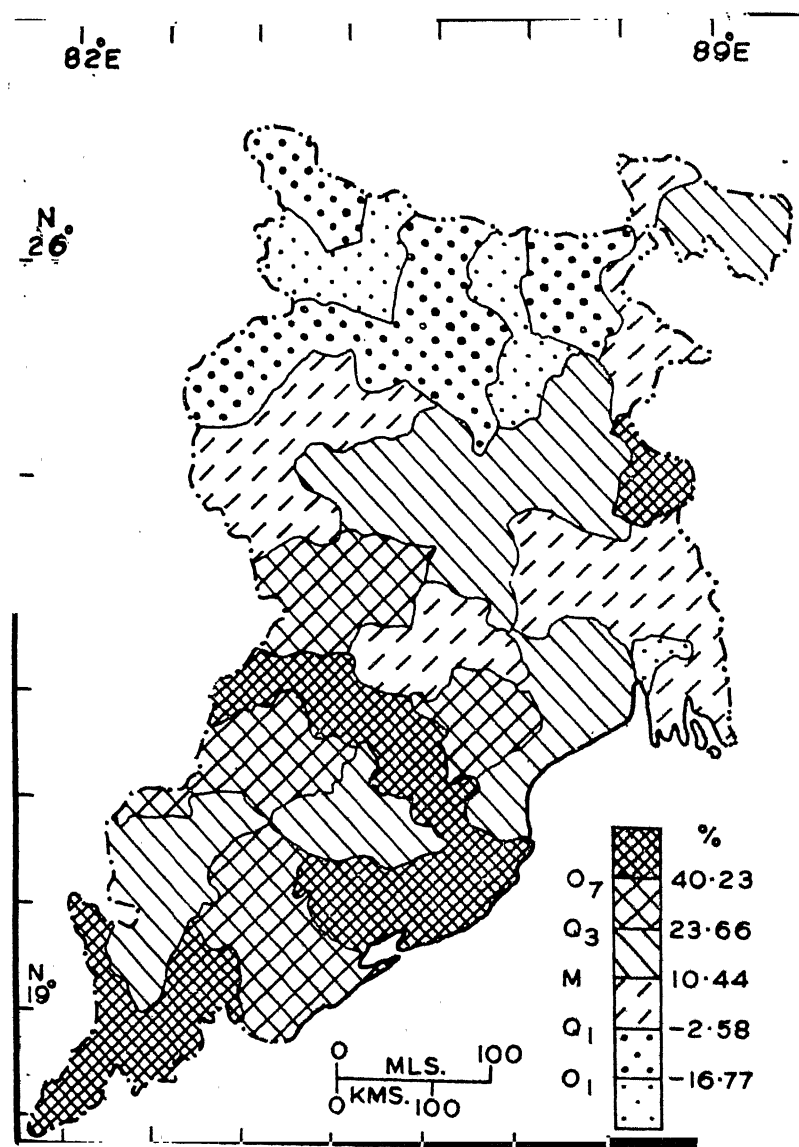
Fig. 4.11 : Bihar, Orissa & W. Bengal—Increase in of Male Migrants, 1961-71

The concentration of increase/decrease of male migrants exhibits somewhat different spatial pattern (Fig. 4.12) than that of change in the share (Fig. 4.3). The western portion of the Orissa Highlands recorded very high increase in both the cases (Figs. 4.10 and 4.12), while Dhanbad-Burdwan also emerged as important centre of concentration of the
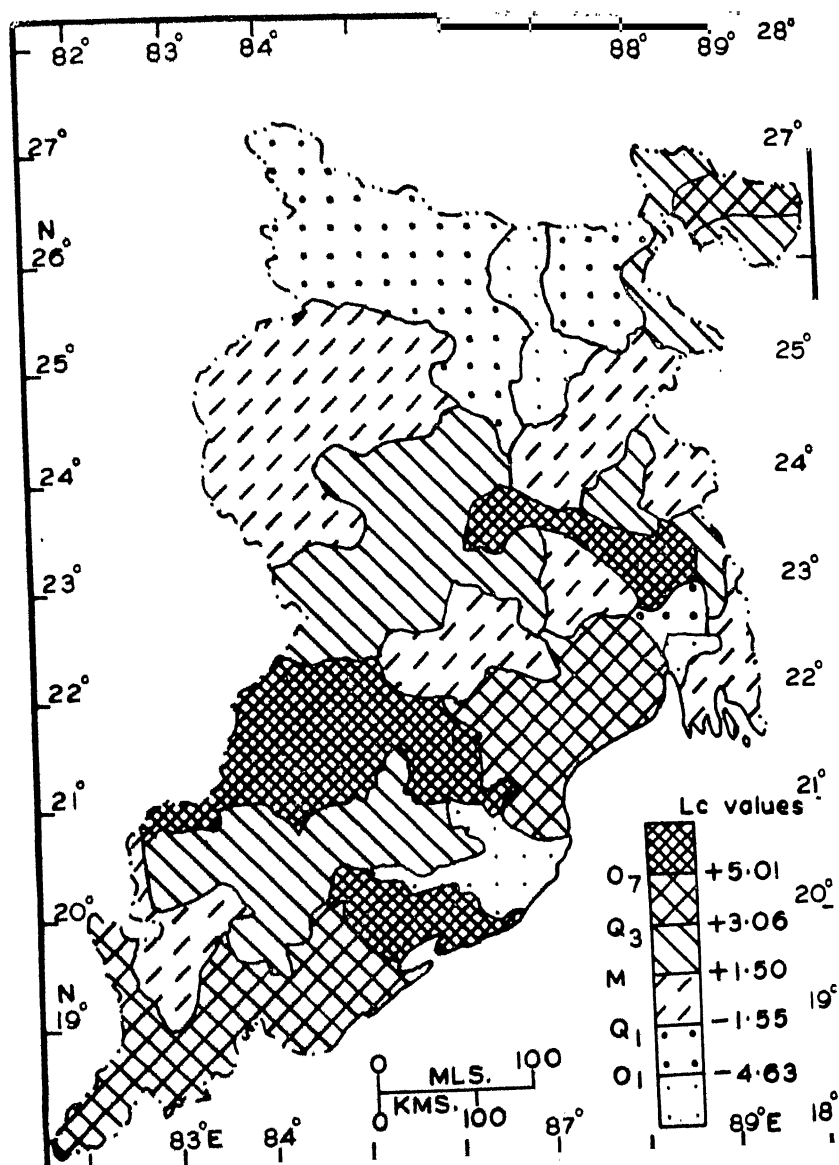
Fig. 4.12 : Bihar, Orissa and W. Bengal—Concentration of Increase/Decrease in Male Migrants, 1961-71

TABLE 4.12 : **Concentration of Increase/Decrease in Male Migrants, 1961-71**

Category	Measure of Dispersion	Lc	Name of Districts
I (Very High)	Above O_7	Above + 5.01	Dhanbad, Sundergarh, Puri, Sambalpur, Keonjhar and Burdwan.
II (High)	$Q_3 - O_7$	+3.06 to + 5.01	Ganjam, Balasore, Koraput, Mayurbhanj, Jalpaiguri and Midnapore.
III (Medium High)	$M - Q_3$	+1.50 to + 3.06	Birbhum, Cooch Behar, West Dinajpur, Darjeeling, Purulia, Nadia, Ranchi, Hazaribagh, Baudh Khondmals, Dhenkanal and Bolangir.
IV (Medium Low)	$Q_1 - M$	— 1.55 to +1.50	Murshidabad, Malda, 24-Parganas, Bankura, Santal Parganas, Singhbhum, Palamu, Gaya, Shahabad, Patna and Kalahandi.
V (Low)	$O_1 - Q_1$	— 4.63 to —1.55	Hooghly, Mongher, Darbhanga, Saran, Champaran, Muzaffarpur and Patna.
VI (Very Low)	Below O_1	Below — 4.63	Saharsa, Bhagalpur, Cuttack, Howrah and Calcutta.

increase in male migrants during 1961-71 decade. The northern section of the Utkal Coastal Plain recorded higher increase. Jalpaiguri is also an important area of high increase in number of male migrants. Cuttack, which experienced the highest change in its share of male migrants have recorded the lowest increase in male migrants. Again the Bihar Plain has the lowest increase while most of the Chota Nagpur Plateau recorded slightly higher increase (Fig. 4.12).

Migrants Classified by Distance Covered

On the basis of distance covered, the total internal migrants have been classified into three categories—intra-district, inter-district and inter-State migrants (Fig. 4.13). Intra-district migrants are those who have migrated within a district ; inter-district migrants are those who have
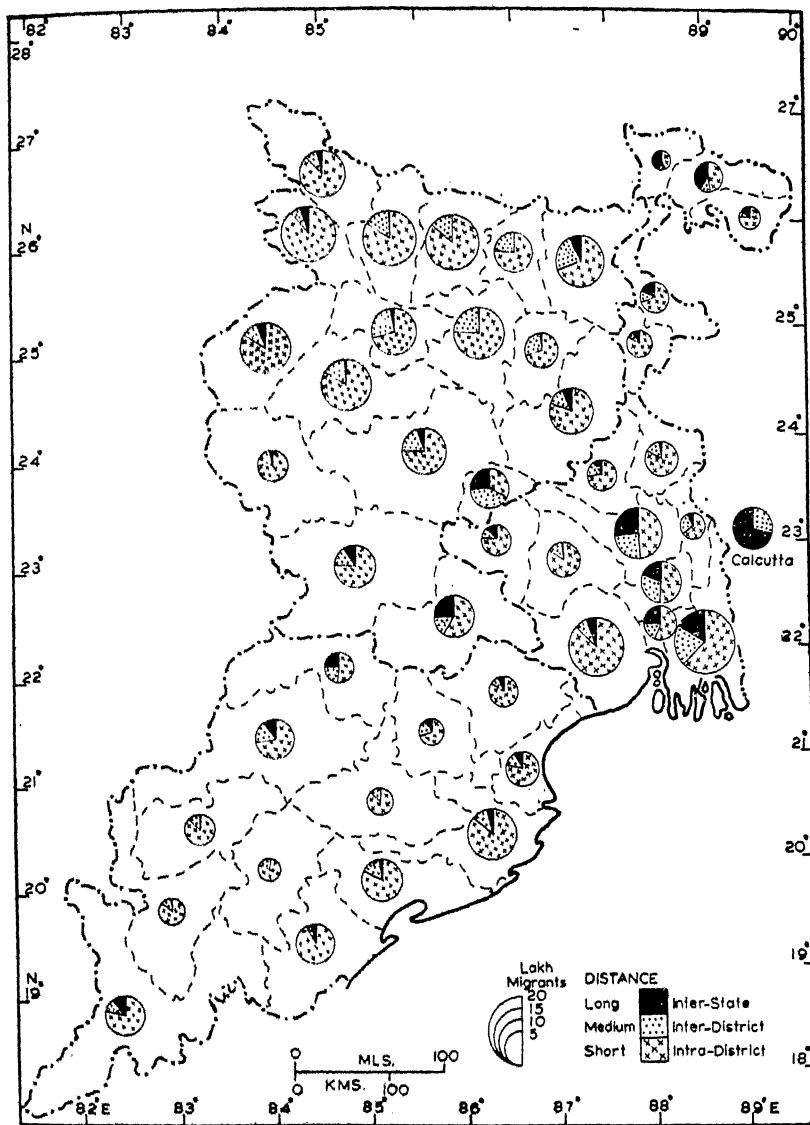
Fig. 4.13 : Bihar, Orissa & W. Bengal—Total Migrants Classified by Distance Covered, 1971

migrated from one district to the another but within the State of enumeration while inter-State migrants are those who have migrated from one State to the other.

On an average the intra-district migrants constitute the largest share of the total migrants (67.83%). Inter-district and inter-State migrants account for 14.25 and 9.70 per cent respectively. This indicates that

short distance migrants constitute the major component. However, the share of intra-district migrants varies from 23.67% in Nadia to 89.67% in Ganjam (Appendix A, Fig. 4.13).

Regional Pattern of Short-Distance Migrants

So far as the regional pattern of the migrants classified by distance covered is concerned, Saran, Ganjam, Kalahandi, Cuttack and Bolangir districts have very high share of short-distance migrants (above 85% of the total migrants) followed by Dhenkanal, Midnapore, Darbhanga, Champaran, Gaya and Palamu (Table 4.13). In contrast, the district of Sundergarh, Howrah, Hooghly, Burdwan and 24-Parganas have low share of short-distance (intra-district) migrants followed by Dhanbad, Cooch Behar, Jalpaiguri, Darjeeling and Nadia with the lowest share.

TABLE 4.13 : **Migrants Classified by Distance Covered, 1971**

Type of Migration (Distance covered)	Very High (Above O_7)	Very Low (Below O_1)
Short (Intra-District)	Saran, Cuttack, Ganjam, Kalahandi and Bolangir.	Dhanbad, Darjeeling, Jalpaiguri, Cooch Behar and Nadia.
Medium (Intra-district)	Dhanbad, Patna, Bhagalpur, Saharsa and Hooghly.	Saran, Darjeeling, Cooch Behar, Midnapore, Malda and Ganjam.
Long (Inter-State)	Calcutta, Darjeeling, Jalpaiguri, Burdwan and Dhanbad.	Gaya, Muzaffarpur, Darbhanga, Saharsa, Dhenkanal and Baudh Khondmals.

In medium distance or inter-district migration, Dhanbad, Patna, Bhagalpur, Saharsa and Hooghly tops the list with the highest share followed by Mongher, Purnea, Burdwan, Calcutta, Sundergarh and Keonjhar (Table 4.13). The districts of Cuttack, Mayurbhanj, Koraput, West Dinajpur, Jalpaiguri and Champaran, on the other hand have the low share followed by Darjeeling, Midnapore, Malda, Cooch Behar, Saran and Ganjam with the lowest proportion of medium distance migrants.

So far as inter-State or long-distance migration is concerned, Calcutta, Darjeeling, Jalpaiguri, Dhanbad and Burdwan have the highest share (above 26.4 per cent) followed by Howrah, Hooghly, Purulia,

24-Parganas, Singhbhum and Sundergarh under high category. As compared to them Bolangir, Bankura, Patna, Bhagalpur and Mongher have a low share of inter-State migration (below 24 per cent) followed by Gaya, Darbhanga, Muzaffarpur, Saharsa, Dhenkanal and Baudh Khondmals with the lowest proportion (below one per cent).

Spatial Pattern of Migrants Classified by Distance Covered

The major component is the short-distance migrants (Fig. 4.13). The long distance migrants are prominent only in the Delta proper around Calcutta and the industrial and mining belt of the eastern Chota Nagpur including Dhanbad, Singhbhum, Ranchi and Purulia. The third zone is near Darjeeling-Jalpaiguri belt and the fourth includes Sundergarh and Sambalpur districts. The other districts, which have slightly higher share of inter-State (long-distance) migrants are the border districts, viz., Saran, Purnea, West Dinajpur, Malda, Santal Parganas, Koraput, Champaran and Shahabad, etc. This is due to crossing the State border even if the migration is short distance.

The medium distance (inter-district) migrants are also important in the Delta proper as well as in industrial and mining belts of Dhanbad, Burdwan, Singhbhum, Ranchi, Sundergarh and Sambalpur. The areas of commercial farming, however, have low share of the medium distance migrants while most of the Bihar Plains and the Utkal coastal plains have higher share of inter-district migrants.

It is obvious from the above studies that the economically attractive areas have a lower proportion of short-distance migrants, while others have predominantly short-distance migrants which is the result of social causes, viz., marriage migration, return of the females to mother's house for giving birth to children, etc. Such migration are usually short distance. In comparison with them the economically attractive areas such as Calcutta, Howrah, Hooghly, Dhanbad, etc. have the largest share of long distance migration followed by the medium-distance migration.

Changes in the Share of Migrants by Distance

On an average the share of intra-district and inter-State migrants have decreased by —1.01 and —0.03 per cent respectively while inter-district migrants have recorded a slight increase (+1.36%) during 1961-71. This means that the short and long-distance migrations have declined and medium distance migration has increased. In Bihar, all the district except Saharsa and Purnea have experienced a decline in the share of intra-district migrants (Appendix A and Fig. 4.14). This feature may be due to rural push working in some districts with urban pull in others, resulting in a higher share of inter-district migration.[3] In Saharsa and Purnea, their high natural increase in the last two decades after taming of the Kosi and control of malaria together with the lack of rural overcrowding seem to be the cause of increase in short distance migration.

TABLE 4.14 : **Change in Migrant Classified by Distance Covered, 1961-71**

Type of Migration	Very High (above O_7)	Very low (below O_1)
Short	Howrah, Saharsa, Purnea, Cuttack, Bolangir and Kalahandi (above +1 S.D.)	Sambalpur, Sundergarh, Keonjhar, Koraput, Ranchi and Dhanbad.
Medium	Burdwan, Ranchi, Singhbhum, Sundergarh and Sambalpur.	Calcutta, Howrah, Cuttack, Kalahandi, Bolangir and Saharsa.
Long	Darjeeling, Dhanbad, Sambalpur, Keonjhar and Koraput.	Calcutta, Howrah, Hooghly, 24-Parganas, Burdwan and Kalahandi.

As compared to them all the districts of West Bengal, except Darjeeling, Murshidabad, 24-Parganas, Burdwan and Midnapore, have experienced an increase in the share of short-distance migrants. It seems that except in such districts of West Bengal which have some economic attractiveness, the share of long-distance migration has decreased resulting in an increase in the share of short-distance migration. Like Bihar all the districts of Orissa, except Cuttack, Bolangir and Kalahandi have recorded a decline in the share of short distance migration.

The medium distance migration has increased in all the districts of the area under study, except Saharsa in Bihar, Howrah and Calcutta in West Bengal and Cuttack, Bolangir, Kalahandi and Koraput in Orissa (Fig. 4.14).

The long-distance migration has decreased in all areas of Bihar and West Bengal except in Saran, Muzaffarpur, Purnea, Santal Parganas, Palamu, Ranchi and .Dhanbad in the former and Darjeeling, Cooch Behar, Birbhum, Midnapore and Purulia in the latter (Fig. 4.14). However, a majority of the districts of Orissa have experienced an increase in the share of long distance migrants. Only Mayurbhanj, Dhenkanal, Baudh Khondmals and Kalahandi have recorded a decline.

As mentioned earlier, the already developed or recently developed areas such as Ranchi, Dhanbad, Sundergarh, Sambalpur, Darjeeling and Cooch Behar, etc., have experienced increase in long-distance migration (Table 4.14) while others recorded a decline in it. However, some economically unattractive areas, viz. Saran and Muzaffarpur, etc. have also recorded

an increase in the share of long-distance migration. This may be due
to increase in return or 'push back' migration from the industrial and
commercial hub of the region, e.g., Calcutta on account of saturation of
the employment market[4].
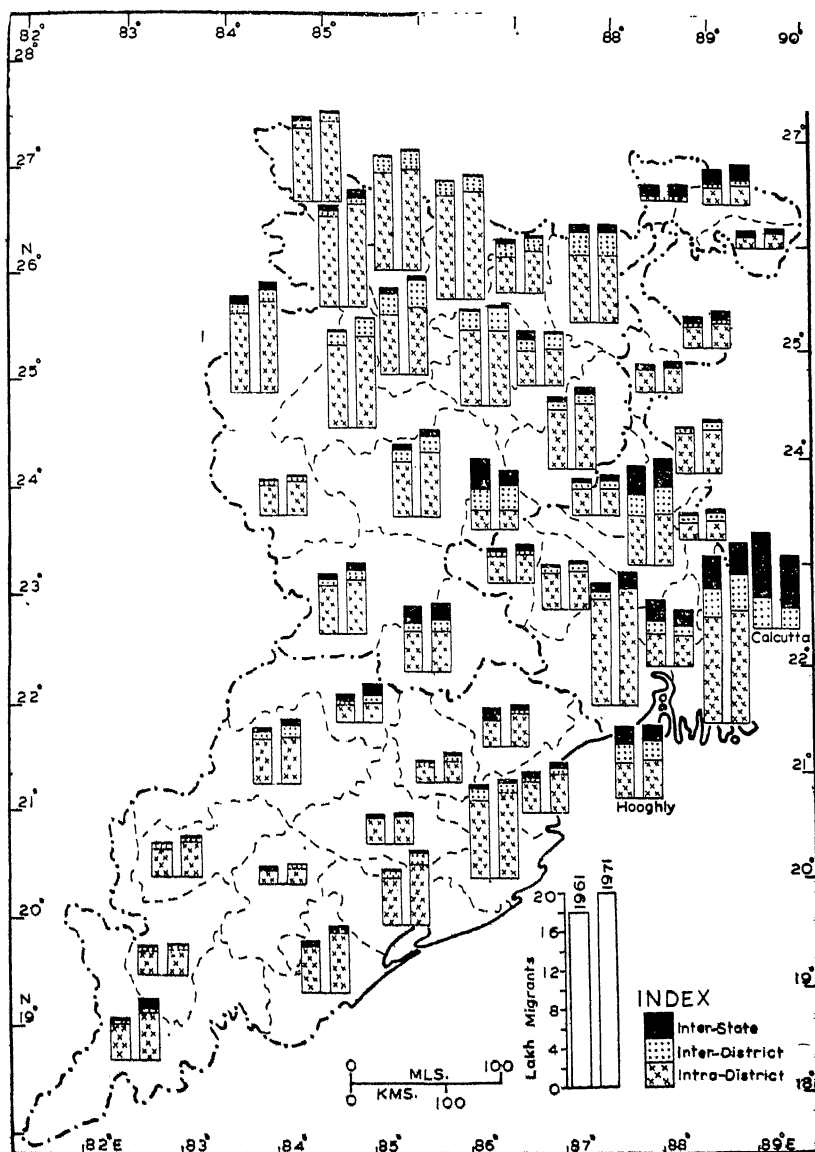
Fig. 4.14 : Bihar, Orissa & W. Bengal—Change in Total Migrants Classified by
Distance Covered, 1961-71

Sex Composition of Migrants by Distance

The sex composition of the intra-districts, inter-district and inter-State migrants may further reveal the causes of this type of migration. The share of male migrants in the short-distance migration is only about one-fourth. The rest is made up by females. The share of male migrants increases with distance. Their share in inter-district and inter-State migration is one-third and one-half respectively. This clearly reveals that marriage migration is usually short distance and economic migration is for longer distance. The fact is also well exemplified by the regional pattern of the share of male migrants in short, medium and long distance migration (Table 4.15 and Fig. 4.15).

Regional Pattern of Distance Covered by Male Migrants

So far as the distance covered by the male migrants (Fig. 4.15) is concerned the share of short-distance migrant is lower. However, the same belt have higher proportion of the long-distance male migrants. There are three distinct patches of the higher share of long-distance male migrants : the first is the Delta proper of the Lower Ganga Plain, the second is near the Himalayan tract of West Bengal (Darjeeling-Jalpaiguri) and the third in the western and south-eastern portion of the Orissa Highlands (comprising Sundergarh and Sambalpur) and the Chota Nagpur Plateau respectively (including Dhanbad, Singhbhum, Ranchi, Hazaribagh, Santal Parganas, etc.). Adjacent to the second zone are the north-eastern portion of the Bihar plain (Purnea) and the central portion of the down Ganga Plain (Malda and Murshidabad). The other scattered patches include Koraput in south western tip of the Orissa Highland and Patna, Saran and Champaran in the north-western portion of the Bihar Plain (Fig. 4.15).

The share of medium distance male migrants also show the same pattern to that of the total migrants (Fig. 4.13). The region pattern of the male migrants classified by distance reveals that most of the developed portion of the study area are on the top in the hierarchy of all, short, medium and long distance migrations of male migrants, while the plain areas, particularly of Bihar, are in the bottom. As compared to them most of the districts of Orissa have higher share of migrants in the categories. Table 4.15 highlights this fact.

The change in the share of male migrant in short, medium and long distance migration would throw more light on the operation of the economic factors in the area under study. On an average, males' share in the short-distance migration has slightly increased ($+0.75\%$) while in medium and long distance migrations it has slightly decreased (-0.99 and -2.71 per cent respectively). In Bihar the share of male migrants has declined in all the categories (short, medium and long) of migrations (Fig. 4.16).
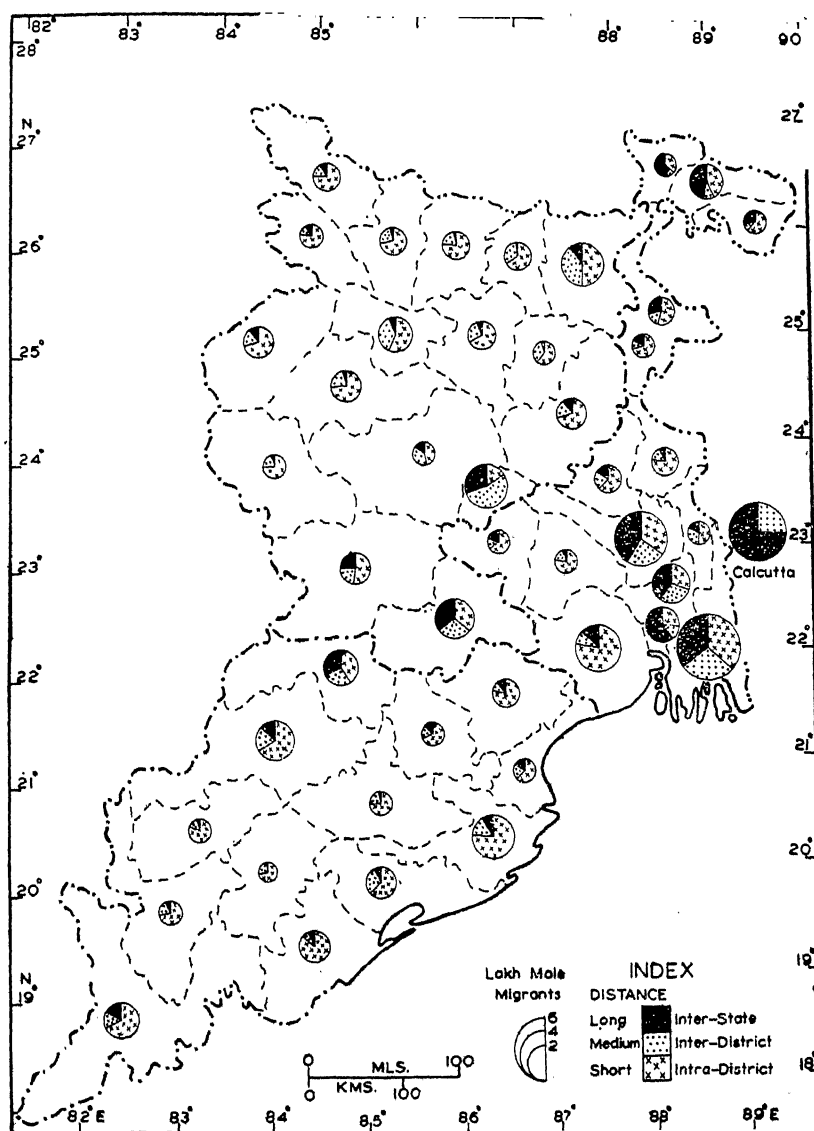
Fig. : 4.15 : Bihar, Orissa & W. Bengal—Male Migrants Classified by Distance Covered, 1971

TABLE 4.15 : **Male Migrants Classified by Distance Covered, 1971**

Type of Migration	Above O_7	Below O_1
Short	Darjeeling, Jalpaiguri, Cooch Behar, Sundergarh and Sambalpur.	Shahabad, Saran, Muzaffarpur, Darbhanga, Mongher and Bhagalpur.
Medium	Calcutta, Dhanbad, Singhbhum, Sundergarh and Koraput.	Gaya, Saran, Muzaffarpur, Darbhanga, Mongher and Bhagalpur.
Long	Calcutta, Howrah, Hooghly, 24-Parganas and Burdwan.	Shahabad, Saran, Champaran, Santal Parganas, Palamu and Mayurbhanj.

There are only a few exceptions, which are not identical in all categories. In West Bengal too, the position is the same. In contrast, all the districts of Orissa have experienced a positive change in all these three types of migrations. There are only a few exceptions (Appendix B). Table 4.16 reveals in brief some of the facts.

TABLE 4.16 : **Change in Male Migrants Classified by Distance Covered, 1961-71**

Type of Migration	Above +1 S.D.	Below —1 S.D.
Short	Burdwan, Sambalpur, Sundergarh, Cuttack, Keonjhar, Koraput, Ganjam and Baudh Khondmals.	Bhagalpur, Purnea, Saharsa and Howrah.
Medium	Sambalpur, Cuttack, Puri, Koraput, Kalahandi and Baudh Khondmals.	Purnea, Saharsa and Ranchi.
Long	Howrah, Midnapore, Kalahandi, Sundergarh, Mayurbhanj and Cuttack.	Champaran, Bhagalpur, Hazaribagh, Keonjhar and Cooch Behar.

Spatial Pattern of Change in the Distance Covered by Male Migrants

Change in the distance covered by male migrants (Fig. 4.16) also exhibits almost the similar pattern to that of the total migrants (Fig. 4.14), with important variations in Dhanbad and 24-Parganas, Dhanbad has recorded a positive change in long-distance male migrants in comparison to a
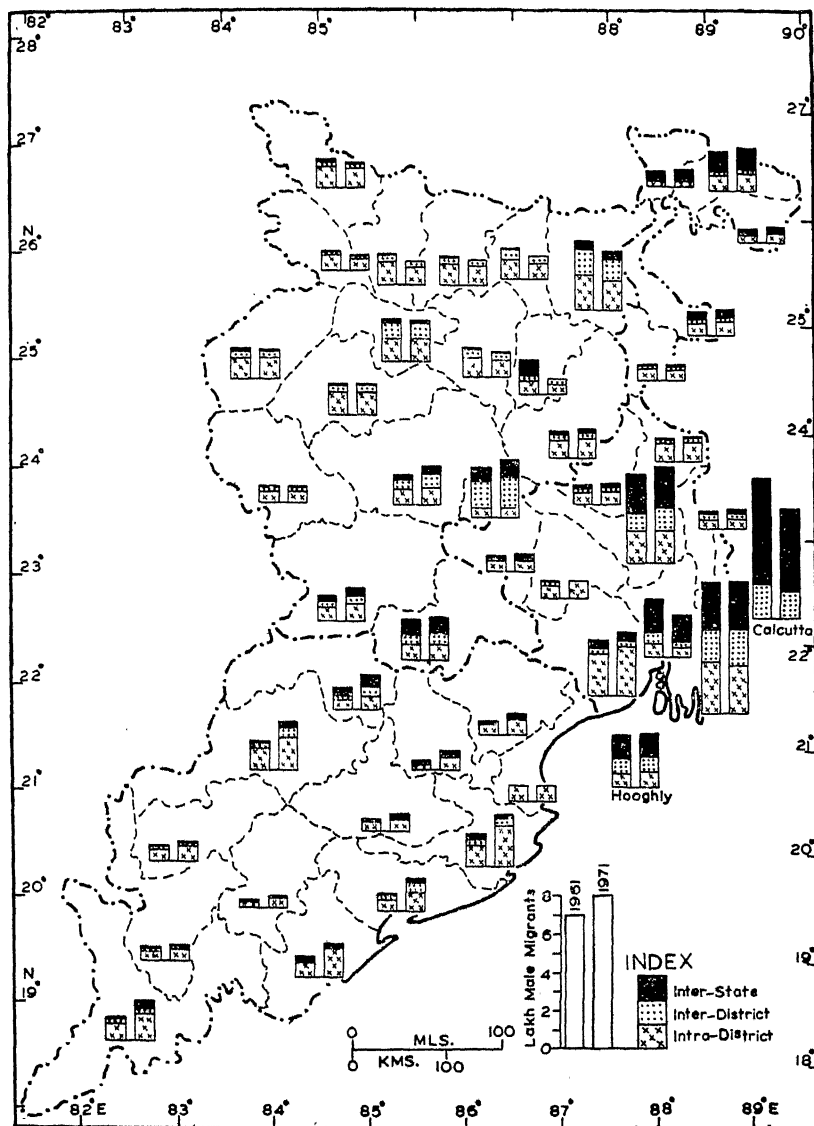
Fig. 4.16 : Bihar, Orissa & W. Bengal—Change in Male Migrants Classified by Distance Covered, 1961-71

decline in the long-distance total migrants. 24-Parganas on the other hand, recorded less positive change in the share of long-distance male migrants.

The medium-distance male migrants also show almost the similar temporal pattern to those of the total migrants.

Migration Classified by Direction of Movements

The total migrants can conveniently be classified into four groups on the basis of direction of movement—rural to rural, rural to urban, urban to urban and urban to rural migrations. The analysis on this line is likely to throw light on the processes at work.

On an average, rural to rural migrants account for the largest share of the total migrants (81.53%). Rural to urban, urban to urban and urban to rural migrations have a share of 10.16, 4.77 and 3.03 per cent respectively.

Spatial Pattern of the Direction of Movement

So far as the spatial pattern of the migrants classified by the direction of movement is concerned the districts of Saran and Darbhanga of Bihar, West Dinajpur of West Bengal and Mayurbhanj and Baudh Khondmals of Orissa top among other districts with a very high share of rural to rural migrants (Table 4.17, Fig. 4.17).

TABLE 4.17 : **Migrants Classified by Direction of Movements, 1971**

Type of Movements	Above O₇ (Very High)	Below O₁ (Very low)
Rural to Rural	Saran, Darbhanga, Mayurbanj, Baudh Khondmals and West Dinajpur.	Howrah, 24-Parganas, Darjeeling, Dhanbad and Singhbhum.
Rural to Urban	Calcutta, Howrah. Dhanbad Singhbhum and Sundergarh.	Saran, Darbhanga, West Dinajpur, Cooch Behar, Malda and Baudh Khondmals.
Urban to Urban	Calcutta, 24-Parganas, Hooghly, Darjeeling and Dhanbad.	Saran, Darbhanga, Saharsa, Dhenkanal, Mayurbhanj and Malda.
Urban to Rural	Patna, Burdwan, Nadia Dhenkanal and Kalahandi	Malda, West Dinajpur, Singhbhum, Saharsa, Mayurbhanj and Bolangir.

Dhanbad and Singhbhum of Bihar; Calcutta and Howrah of West Bengal; and Sundergarh of Orissa experienced a very high level of rural to urban migration (Table 4.17, Fig. 4.17). Darbhanga and Saran of Bihar ; West Dinajpur, Cooch Behar and Malda of West Bengal ; and Baudh Khondmals of Orissa experienced on the other hand, a low migration.

DIRECTION
Rural to Rural
Rural to Urban
Urban to Urban
Urban to Rural
Others
Unclassified

Lakh Migrants
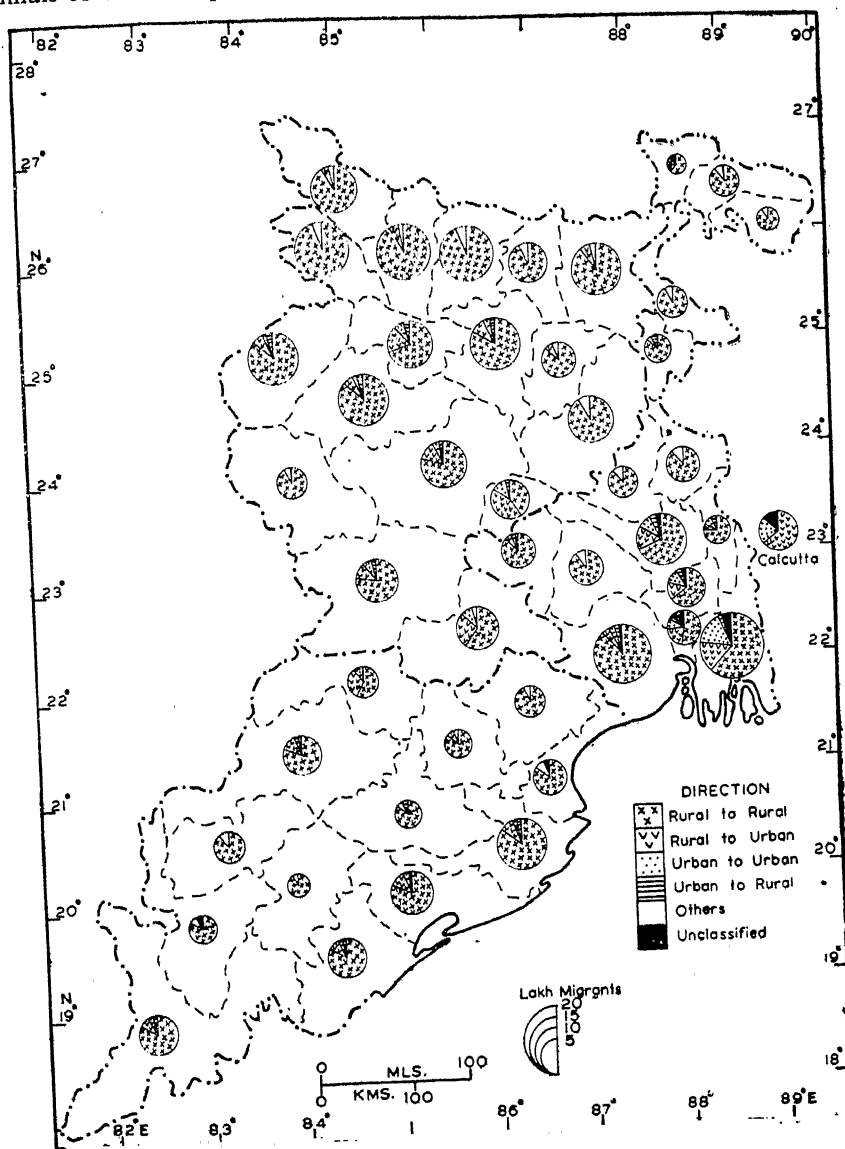
Fig. 4.17 : Bihar, Orissa & W. Bengal—Total Migrants Classified by Direction of Movement, 1971

Calcutta, 24-Parganas, Hooghly and Darjeeling of West Bengal and Dhanbad of Bihar have recorded a very high share of urban to urban migrants (Table 4.17, Fig. 4.17). As compared to them Saharsa, Darbhanga and Saran districts of Bihar, Malda of West Bengal and Dhenkanal and Mayurbhanj of Orissa have very low share of urban to urban migrants in 1971.

Dhenkanal and Kalahandi districts of Orissa, Patna of Bihar and Nadia and Burdwan of West Bengal experienced very high level of urban to rural migrants (Table 4.17, Fig. 4.17). In contrast, Singhbhum and Saharsa of Bihar, Malda and West Dinajpur of West Bengal and Mayurbhanj and Bolangir of Orissa are in the very low category.

Spatial Pattern of Migrants Classified by Direction of Movement

It is obvious from Fig. 4.17 that rural to rural movement is the largest component. Rural to urban movements are found mainly in the Delta proper around Calcutta, including Calcutta, Howrah, Hooghly, 24-Parganas and Burdwan (Fig. 4.17). The other zone comprise Dhanbad, Singhbhum, Hazaribagh, Ranchi, Sundergarh and Sambalpur. Patna also have slightly higher proportion of the R-U migrants, followed by Mongher in the Bihar Plain. Again the areas of the Utkal Coastal Plain also have slightly higher share of rural-urban migrants. Darjeeling-Jalpaiguri do have appreciable share of R-U stream, indicating immigration to tea gardens from the rural areas.

The urban to urban migrants are also important in the traditionally developed Calcutta-Burdwan Zone to Dhanbad-Singhbhum-Sundergarh Zone. Besides them only Patna have slightly higher proportion of urban to urban migrants. Thus the urban to urban movement is limited only to the developed (Figs. 2.12 and 2.13) and urbanized zones (Fig. 2.16). There are three distinct belts of higher share of urban to rural migrants ; one around Calcutta, the second extend right from Patna-Shahabad-Mongher to Dhanbad-Singhbhum-Ranchi zone and the third in the Utkal Coastal Plain and adjoining regions including Koraput, Bolangir, Dhenkanal and Midnapore. It seems that on account of lack of employment opportunities in the rural areas people are pushed to the nearby urban areas in the more developed section and to the distant urban centres from the less urbanized agricultural Bihar Plain, but again they are pushed back to the rural areas[5] because the employment opportunities in the urban centres are not in commensurate with the volume of rural-urban migration. Consequently the urban to rural movement starts.

Regional Pattern of Change in Direction of Movement

So far as the change in the share of rural to rural, rural to urban, urban to urban and urban to rural migrants during 1961-71 is concerned, on an

average the first named has gone down in position while the latter three have gone up (−1.98, +0.19, +0.44 and +1.25 per cent respectively). Bhagalpur district of Bihar and Malda, Murshidabad and Howrah of West Bengal recorded the highest positive change (above 8.04% and +3σ from mean) in the rural to rural migrants (Table 4.18, Fig. 4.18). Saharsa of Bihar and Sambalpur, Sundergarh, Dhenkanal and Kalahandi of Orissa on the other hand, experienced the highest decline (below −6.99%).

Dhanbad district of Bihar and Sundergarh and Sambalpur districts of Orissa experienced one of the highest positive change (above 6.21% up to 24.27% +1σ to +4σ), while Darjeeling 24-Parganas, Hooghly, Calcutta and Howrah of West Bengal recorded the highest negative change (below −5.83% to −17.87% and from −1σ to above −3σ) in the share of rural to urban migrants (Table 4.18, Fig. 4.18).

In the case of the urban to urban migration also Dhanbad, Hazaribagh, Ranchi and Singhbhum districts of Bihar and Nadia district of West Bengal achieved the highest positive change (above 2.06% ranging up to 6.92% and above +1σ up to above +4σ). As compared to them Darjeeling, Calcutta and Howrah districts of West Bengal and Bolangir, Cuttack and Sundergarh districts of Orissa experienced the highest negative change (from −1.06 to −2.88%) (Table 4.18, Fig. 4.18).

TABLE 4.18 : **Change in Migrants Classified by Direction of Movements, 1961-71**

Type of Movement	Above +1 S.D. (Very High)	Below −1 S.D. (Very Low)
Rural to Rural	Howrah, Hooghly, Malda, Murshidabad, Patna, Hazaribagh and Bhagalpur	Saharsa, Sambalpur, Sundergarh, Dhenkanal and Kalahandi.
Rural to Urban	Dhanbad, Sundergarh and Sambalpur.	Calcutta, Howrah, Hooghly, 24-Parganas and Darjeeling.
Urban to Urban	Dhanbad, Singhbhum, Ranchi, Hazaribagh and Nadia.	Calcutta, Howrah, Sundergarh, Darjeeling, Cuttack and Bolangir.
Urban to Rural	Patna, Gaya, Dhenkanal, Kalahandi and Keonjhar (above O_7)	Darjeeling, Jalpaiguri, Nadia, Singhbhum, Puri and Bolangir (below O_1)

So far as the change in the share of urban to rural migrants is concerned, Patna and Gaya districts of Bihar and Dhenkanal, Kalahandi and

Keonjhar of Orissa experienced a very high change (above 2.53%) (Table 4.18, Fig. 4.18). In contrast, Singhbhum of Bihar, Darjeeling, Jalpaiguri and Nadia districts of West Bengal and Puri and Bolangir of Orissa experienced very low change in the share of urban to rural migrants during 1961-71.
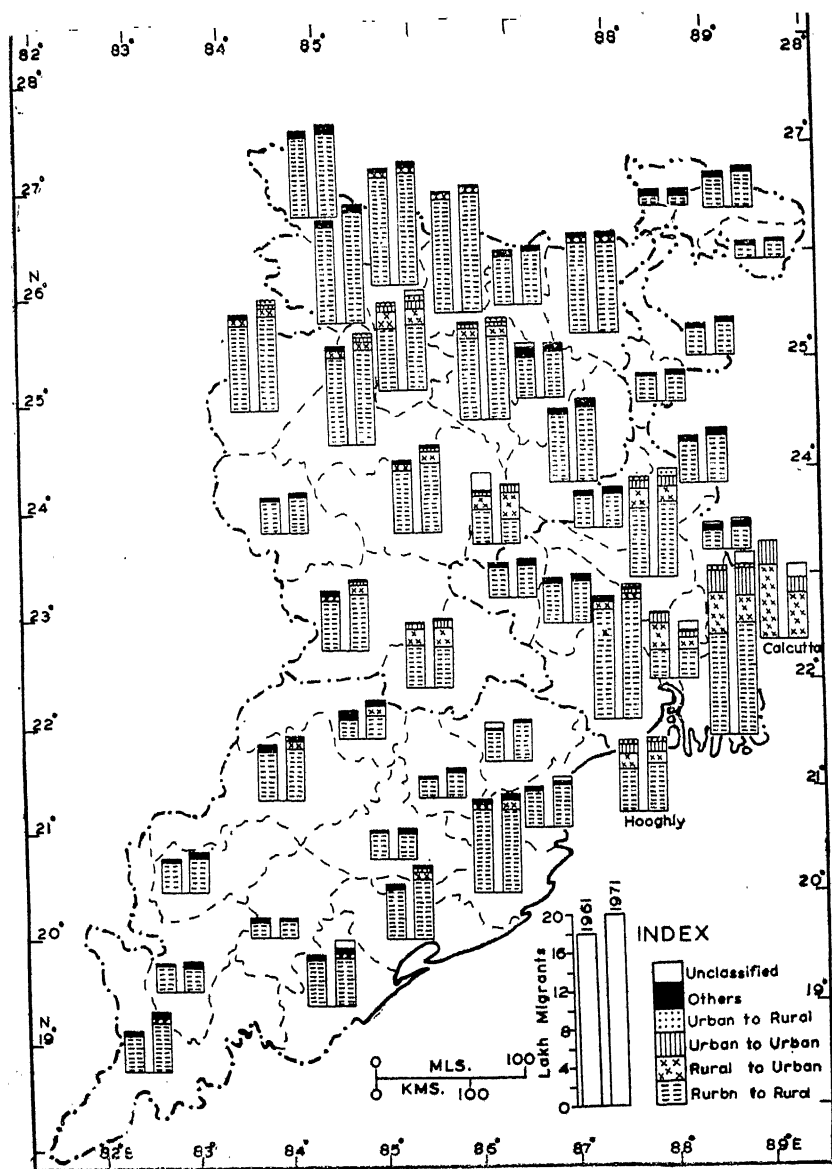
Fig. 4.18 : Bihar, Orissa & W. Bengal—Change in Total Migrants Classified by
Di......... of Mov.m..nt 1961-71.

Sex Composition of the Migrants by Direction

On an average male migrants account for 66.09, 19.10, 7.62 and 4.22 per cent respectively of rural to rural, rural to urban, urban to urban and urban to rural migrations. Since rural to urban and urban to urban migrations are more important from economic point of view the share of male migrants are higher because they generally migrate on account of economic causes.

So far as the regional pattern of males' share in rural to rural migration is concerned Malda, Baudh Khondmals Jalpaiguri, West Dinajpur and Mayurbhanj districts top among all the districts of the study area (Table 4.19, Fig. 4.19). In comparison with them Dhanbad, Singhbhum, Howrah, Calcutta, 24-Parganas and Patna districts have recorded very low figures of rural to rural male migrants. In rural to urban movements Calcutta, Howrah, Dhanbad, Singhbhum and Sundergarh have very high share of male migrants. In contrast, Baudh Khondmals, Cooch, Behar, Malda, Bankura, West Dinajpur and Jalpaiguri have registered very low share of

TABLE 4.19 : **Male Migrants Classified by Direction of Movements, 1971.**

Type of Movements	Above O_7 (Very high)	Below O_1 (Very low)
Rural to Rural	Malda, Baudh Khondmals, Jalpaiguri, West Dinajpur and Mayurbhanj.	24-Parganas, Calcutta, Howrah, Dhanbad, Singhbhum and Patna.
Rural to Urban	Calcutta, Dhanbad, Singhbhum, Howrah and Sundergarh.	Baudh Khondmals, Cooch Behar, Malda, Bankura, West Dinajpur and Jalpaiguri.
Urban to Urban	Calcutta, Hooghly, 24-Parganas, Singhbhum and Patna.	Bankura, Dhenkanal, Malda, Jalpaiguri, Baudh Khondmals and Mayurbhanj.
Urban to Rural	Dhenkanal, Kalahandi, Keonjhar, Bankura and Nadia.	Dhanbad, Saharsa, Patna, West Dinajpur and Mayurbhanj.

rural to urban male migrants. In Urban to urban migration Calcutta, 24-Parganas, Howrah, Singhbhum and Patna districts are the leaders while Bankura, Malda, Jalpaiguri, Dhenkanal, Baudh Khondmals and Mayurbhanj districts have very low share of male migrants. So far as urban to

rural migrants is concerned Bankura, Nadia, Dhenkanal, Kalahandi and Keonjhar are characterized by very high percentage of male migrants. As compared to them Dhanbad, Patna, Saharsa, West Dinajpur and Mayurbhanj have very low share of male migrants in urban to rural migration.

Change in Share of Male Migrants by Direction

On an average, the share of male migrants registered a positive change in the case of rural to rural and urban to urban migration (+0.55 and +0.11 per cent respectively), while it has been negative in the cases of rural to urban and urban to rural migrations (—3.41 and —4.41 per cent respectively). In other words, the share of male migrants in rural push and push back movements has declined.[6]

So far as the regional pattern of change in males share in rural to rural migration is concerned Burdwan district of West Bengal and Koraput of Orissa experienced a very high positive change (above +11.93% and above +2σ) (Table 4.20, Fig. 4.19). In contrast, Saharsa of Bihar recorded the highest decline (more than —10.83%, below —2σ).

TABLE 4.20 : **Change in Male Migrants Classified by Direction of Movements, 1961-71**

Type of Movements	Above 1 S.D. (Very high)	Below −1 S.D. (Very low)
Rural to Rural	Burdwan, Koraput, Sambalpur, Sundergarh, Cuttack and Baudh Khondmals.	24-Parganas, Dhanbad, Bhagalpur, Purnea and Saharsa.
Rural to Urban	Gaya, Midnapore, Baudh Khondmals, Sambalpur and Bolangir.	24-Parganas, West Dinajpur, Nadia, Bankura and Patna.
Urban to Urban	Malda, Baudh Khondmals, Cuttack, Dhenkanal, Puri and Bolangir (Above O_7)	Saharsa, Palamu, Purulia, Nadia, Puri and Ganjam (Below O_1).
Urban to Rural	Dhanbad, Mongher, Sundergarh, Keonjhar and Puri.	Patna, Gaya, Saharsa, Nadia, 24-Parganas and Balasore.

In rural to urban migration, Baudh Khondmals district of Orissa exhibited extremely high positive change (+27.07%, +3σ) in the share of male migrants (Table 4.20, Fig. 4.20). In comparison Bankura and Nadia districts of West Bengal recorded an extremely high negative change (—23.73%—2σ and —3σ).

In urban to urban migration Baudh Khondmals, Cuttack, Dhenkanal, Puri and Bolangir of Orissa and Malda of West Bengal experienced a very high positive change in the share of male migrants (+17.61%, above Octile seven) (Table 4.20, Fig. 4.20). As compared to them Saharsa and Palamu
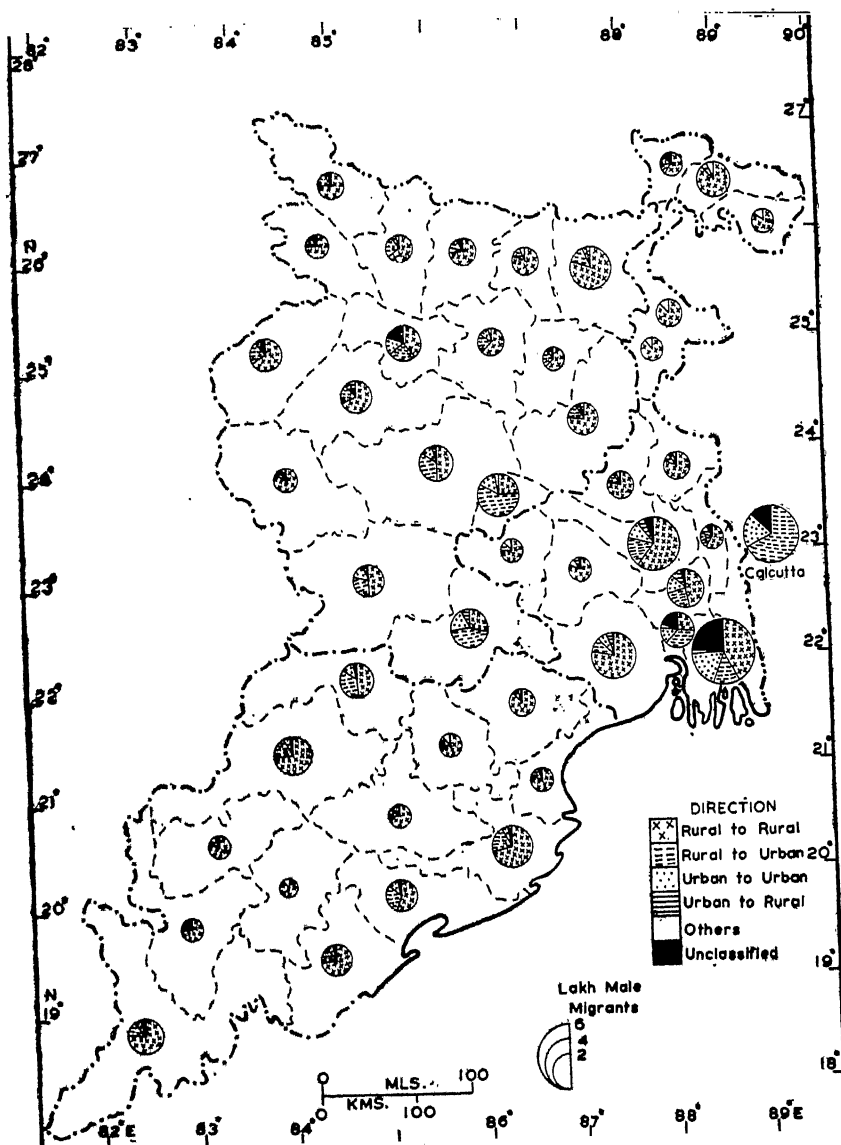
Fig. 4.19 : Bihar, Orissa & W. Bengal—Male Migrants Classified by Direction of Movement, 1971

of Bihar, Nadia and Purulia of West Bengal and Puri and Ganjam of Orissa recorded the highest negative change (below —9.06% and below Octile one).

In urban to rural migration Dhanbad and Mongher of Bihar and Sundergarh, Keonjhar and Puri of Orissa led with the highest positive change in the share of male migrants (above +10.28%, +1σ) (Table 4.20, Fig. 4.20). Gaya, Patna, and Saharsa of Bihar, 24-Parganas and Nadia
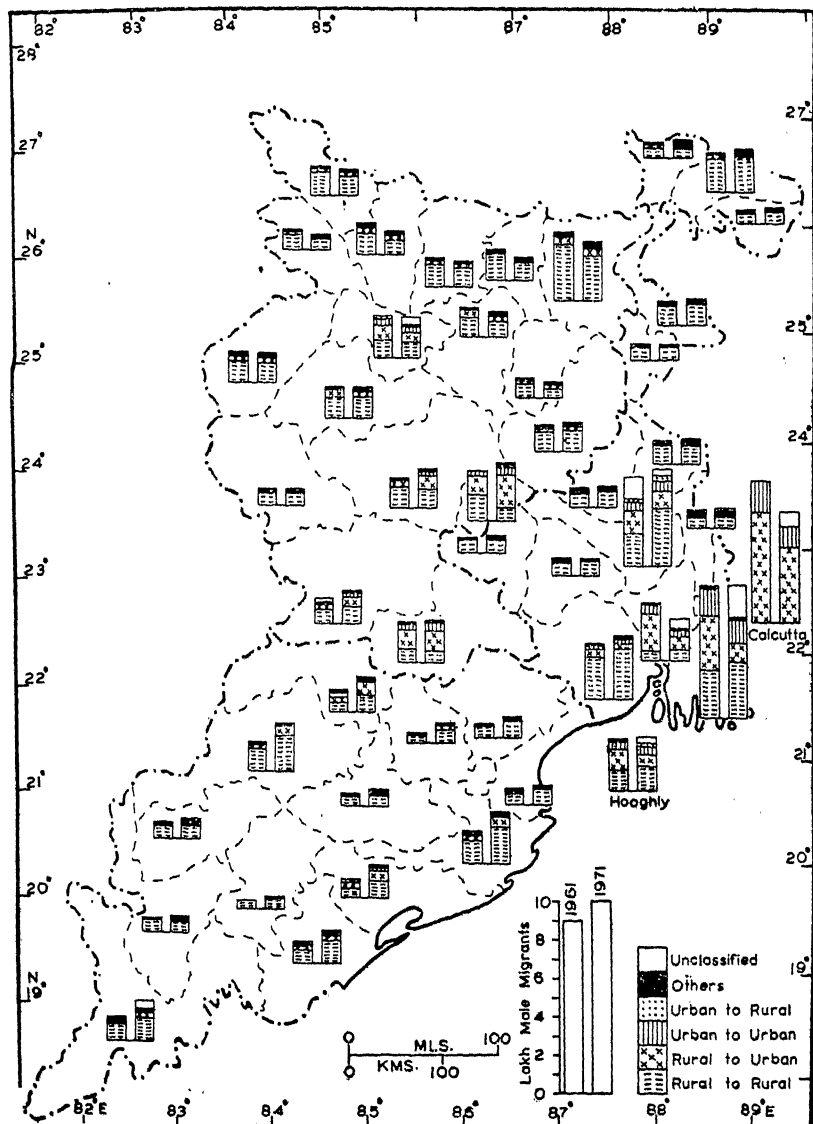
Fig. 4.20 : Bihar, Orissa & W. Bengal—Change in Male Migrants Classified by

of West Bengal and Balasore of Orissa on the other hand returned the highest negative change (above −19.10% up to −48.48% and from −1σ to −3σ).

Male Migrants Classified by Rural-Urban Composition and Distance of Migration

The rural to rural, rural to urban, urban to urban and urban to rural male migrants classified by distance travelled is expected to throw even more light on the process leading to their migration. On the average, short, medium and long distance rural to rural male migrants account for 77.40, 15.32 and 7.64 per cent of total population respectively. In other words rural to rural male migration is usually short-distance, gradually decreasing with distance. The same trend is also found in the cases of rural to urban and urban to rural male migrants, but with less force. The percentages of short, medium and long distance male migrants are 47.80, 29.05 and 16.55 respectively in the former case and 43.17, 30.65 and 21.23 respectively for the latter. In the case of urban to urban male migrants it is maximum in the category of medium distance migration followed respectively by long and short distance movements.

So far as the trend of change in the share of male migrants in rural to rural migration is concerned, it has increased slightly in short distance migration but decreased in the case of medium and long distance migration. The rate of change is +0.89, −0.03 and −0.62 per cent respectively for short, medium and long distance migration. In the case of rural to urban migration the change is positive in the case of short and medium distance migration (+1.41 and +1.40% respectively). It recorded, however, negative change in case of the long distance migration (−1.80%). So far as urban to urban migration is concerned, it has recorded a negative change in the cases of short and long distance migration (−8.25 and −1.14 per cent respectively), more so in case of the short distance migration. In the case of urban to rural migration negative change has been recorded in short and medium distance migration (−0.87, −0.08 per cent respectively), but it was positive in case of long-distance migration (+0.88).

The pattern of change of the male migrants in rural to rural, rural to urban, urban to urban and urban to rural in short, medium and long distance migration indicates the reduction in 'pull' of the big urban, industrial and commercial centres. Rather 'push back' factor seem to be operating in them, which is obvious from positive change in long-distance male migration from urban to rural areas. The increase in short distance migration of males in rural to rural migration may be on account of social reasons.

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5

Levels of Economic Development

THE importance of levels of economic development in population migration cannot be overemphasized. In the short run, population migration is to a great extent, a result of regional disparity in the levels of economic development. Human migrations act on economic organization through redistribution of population. The great intensity and rapidity of migration which began in the nineteenth century is basically linked with the upsurge of industry.[1] Industrialization by establishing new forms of economic organization, developing certain areas, causing overcrowding in others, and provoking widespread economic and social imbalance, has resulted in a heavy shift in population, both on national and on the international level. Recently the flow of international migration has slowed down, and internal migration now accounts for principal movements of population.[2] In Brazil[3] and Africa[4] the same trend has been observed. In contemporary African mobility, which consists of three main components in the rural-urban continuum, economic factors are of prime importance.[5] In Sierra Leone[6] as well as in a number of developed countries,[7] the same relationship has been observed.

Since the levels of economic development cannot be measured directly, a number of indicators have been selected for analysing them in the study area (see Chapter III, pp. 89). The indicators are meant for measuring different aspects of development in each district of the region. The following sixteen indices have been selected :

    (i)   Percentage of urban population in total population,
    (ii)   Percentage of workers in total population,
    (iii) Percentage of workers engaged in non-agricultural activities,
    (iv) Cultivable area per agricultural worker,
    (v)   Net area sown per agricultural worker,
    (vi) Area sown more than once as percentage of net sown area,
    (vii) Average daily wages of agricultural labourers,
  (viii) Percentage of workers engaged in manufacturing,

(ix)   Workers per lakh of population employed in registered working factories,
(x)   Percentage of workers engaged in trade and commerce,
(xi)   Hospital beds per lakh of population,
(xii)   Per cent literates in total population,
(xiii) Percentage of workers engaged in transport,
(xiv)   Length of surfaced roads per hundred sq. kilometres,
(xv)   Length of surfaced roads per lakh of population, and
(xvi)   Number of vehicles on road per lakh of population.

In order to know the degree of association among the selected indices Kendall Coefficient of Concordance (W) has been calculated with the help of the following formula, which is suitable for tied observation :[8]

$$W = \frac{S}{\frac{1}{12} K^2(N^3 - N) - K\underset{T}{\Sigma}T}$$

For calculating W, the districts were ranked for each of the sixteen indicators (Appendix H) by summing up the ranks for all the indicators composite ranks (Rj) were obtained for each district (Table 5.1). By summing up the squared deviation of the composite rank $\left(Rj - \frac{\Sigma Rj}{N} \right)^2$ for each district, the value of 'S' (584075) was obtained. The process is explained in Table 5.1.

$K \underset{T}{\Sigma} T$ was obtained by adding the 'T' value of such indicators which have tied observations.

$$T = \frac{\Sigma(t^3 - t)}{12}$$

For Example : If the first and twelfth indicators consists of one set of tie with two observations, then

$$T_1 = \frac{2^3 - 2}{12} = .5$$

$$T_{12} = .5$$

Since the third and seventh indicators consist of three sets of ties with two observations, so that :

$$T_3 = \frac{(2^3 - 2) + (2^3 - 2) + (2^3 - 2)}{12} = 1.5$$

$$T_7 = 1.5$$

TABLE 5.1 : Calculation of 'W' for the Levels of Economic Development, 1970-71

Districts	Composite rank (Rj)	$Rj - \dfrac{Rj}{N}$	$\left(Rj - \dfrac{Rj}{N}\right)^2$	Composite rank (Rj)	$Rj - \dfrac{Rj}{N}$	$\left(Rj - \dfrac{Rj}{N}\right)^2$
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Patna	259	−112.80	12724	123.5	−90.4	8172
Gaya	448	76.2	5806	260.5	28.6	818
Shahabad	374.5	2.7	7	200.0	−31.9	1018
Saran	531	160.0	25600	339.0	107.1	11470
Champaran	476.5	104.7	10962	293.5	61.6	3995
Muzaffarpur	529.5	157.7	24869	335.5	103.6	10733
Darbhanga	530	158.2	25027	322.5	90.6	8208
Mongher	395	23.2	538	231.0	−0.9	1
Bhagalpur	384	12.2	149	216.0	−15.9	253
Saharsa	534	162.2	26309	330.5	98.6	9722

TABLE 5.1—*Contd.*

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Purnea	499	127.2	16180	309.5	77.6	6022
Santal Parganas	477	105.2	11067	292.5	60.6	3672
Palamu	467	95.2	9063	296.0	64.1	4109
Hazaribagh	406.5	34.7	1204	236.5	4.6	21
Ranchi	283	—88.8	7885	148.5	—8.34	6956
Dhanbad	215	—156.8	24586	111.0	—120.9	14617
Singhbhum	283	—88.8	7885	151.0	—80.9	6545
Darjeeling	165.5	—206.3	42560	58.0	—173.9	30241
Jalpaiguri	220	—151.8	23043	119.0	—112.9	12746
Cooch Behar	387	15.20	231	230.5	—1.4	2
West Dinajpur	411.5	39.7	1576	252.5	20.6	424
Malda	428.5	56.7	3215	270.0	38.1	1452
Murshidabad	401	29.20	853	235.0	3.1	10
Nadia	238.5	—133.3	17769	119.0	—112.9	12746
24-Parganas	284	—87.8	7709	133.0	—98.9	9781

Howrah	240	−131.8	17371	100.0	−131.9	17398
Calcutta	60	−311.8	97219	19.5	−212.4	45114
Hooghly	233	−138.8	19265	102.0	−129.9	16874
Burdwan	216	−155.8	24274	97.5	−134.4	18063
Birbhum	270	−1.30	2	211.5	−20.4	416
Bankura	388.5	16.7	279	211.0	−20.9	437
Midnapore	401	29.2	853	234.0	2.1	4
Purulia	443	71.2	5069	226.0	−5.9	35
Sambalpur	261	−110.8	12277	119.0	−112.9	12746
Sundergarh	246	−125.8	15826	110.5	−121.4	14738
Keonjhar	430	58.2	3387	251.0	19.1	365
Mayurbhanj	538.5	166.7	27789	321.0	89.1	7939
Balasore	444.5	72.7	5285	264.0	32.1	1030
Cuttack	301	−68.8	4733	149.0	−82.9	6872
Dhenkanal	423	51.2	2621	254.0	−22.1	488
Baudh Khondmals	461	90.2	8136	267.5	35.6	1267

TABLE 5.1—Contd.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Bolangir	483	111.2	12365	279.5	47.6	2266
Kalahandi	493	121.2	14689	297.0	65.1	4238
Koraput	394	22.2	493	226.5	—5.4	29
Ganjam	335.5	—36.3	1318	160.5	—71.4	5098
Puri	308.5	—63.3	4007	149.5	—82.4	6790
	$\frac{17101.5}{46}$ $\bar{X}=371.77$	S=584075		$\frac{9840}{46}$ $=213.91$		S=325741

Since the fourth, fifth, thirteenth and sixteenth indicators consist of four sets of ties with two observations, so that :

$$T_4 = \frac{(2^3-2)+(2^3-2)+(2^3-2)+(2^3-2)}{12} = 2.0$$

$$T_5 = 2$$

$$T_{13} = 2$$

$$T_{16} = 2$$

The eighth, ninth, tenth and fifteenth indicators have two sets of ties with two observations, so that :

$$T_8 = \frac{(2^3-2)+(2^3-2)}{12} = 1$$

$$T_9 = 1$$

$$T_{10} = 1$$

$$T_{15} = 1$$

The eleventh indicator has eight sets of ties with two observations, so that :

$$T_{11} =$$

$$\frac{(2^3-2)+(2^3-2)+(2^3-2)+(2^3-2)+(2^3-2)+(2^3-2)+(2^3-2)+(2^3-2)}{12}$$

$$= 4.0$$

Thus $K\underset{T}{\Sigma}T = .5+0+1.5+2+2+0+1.5+1+1+1+4+.5+2+2+1+2$

$$= 22$$

and $\quad W \quad = \dfrac{S}{\frac{1}{12}^2 \ K(N^3-N) - K\underset{T}{\Sigma}T}$

$$= \frac{584075}{\frac{1}{12}(16)^2 (46^3-46) - 22}$$

$$= \frac{584975}{21.33 \times 97290 - 22}$$

$$= 0.28$$

The significance of the value of W (.28) was tested with the help of the following formula, which is suitable for large samples (N larger than 7).[9]

$$\chi^2 = K(N-1)W$$

with df $= N-1$

$$\chi^2 = 16(46-1).28 = 201.6$$

The value of χ^2 (201.6) is significant even at .001 level.[10]

Spatial Pattern of the Levels of Economic Development

In order to know the regional pattern of the levels of economic development in 1970-71, the districts of the study area have been categorized into six groups on the basis of the composite rank of the sixteen indices, with the help of Median, Quartiles and Octiles.

TABLE 5.2 : **Districts according to Levels of Economic Development (16 indices), 1970-71**

Category	Position of median quartile or Octile	Value of composite Rank	Name of the Districts
I (Very High)	Above O_7	Below 233	Calcutta, Darjeeling, Dhanbad, Burdwan and Jalpaiguri.
II (High)	$Q_3 - O_7$	283—233	Hooghly, Howrah, Nadia, Sundergarh, Sambalpur and Patna.
III (Med. High)	$M - Q_3$	394.5—283	Ranchi, Singhbhum, 24-Parganas, Cuttack, Puri, Ganjam, Birbhum, Cooch Behar, Bankura, Shahabad, Bhagalpur and Koraput.
IV (Med. Low)	$Q_1 - M$	462—394.5	Dhenkanal, Keonjhar, Balasore, Murshidabad, Midnapore, West Dinajpur, Malda, Mongher, Hazaribagh and Gaya.
V (Low)	$O_1 - Q_1$	499—462	Baudh Khondmals, Palamu, Champaran, Santal Parganas, Bolangir and Kalahandi
VI (Very Low)	Below O_1	Above 499	Purnea, Muzaffarpur, Darbhanga, Saran, Saharsa and Mayurbhanj.

Calcutta, Darjeeling, Jalpaiguri and Burdwan districts of West Bengal and Dhanbad district of Bihar exhibited a very high levels of economic development followed by Patna district of Bihar; Nadia and Howrah districts of West Bengal; and Sundergarh and Sambalpur districts of Orissa under high category. In contrast, Purnea, Muzaffarpur, Darbhanga, Saran and Saharsa districts of Bihar and Mayurbhanj district of Orissa recorded the lowest level of economic development in 1970-71, followed by Champaran, Santal Parganas and Palamu districts of Bihar and Bolangir, Kalahandi and Baudh Khondmals districts of Orissa under low category. The other districts fall close to the median level of development.

It is apparent from the above study (Table 5.2, Fig. 5.1) that the areas of very high level of economic development are found in two distinct zones : the first extends from Calcutta through Burdwan to Dhanbad districts, and the second consists of Darjeeling and Jalpaiguri districts in the north. The first zone corresponds with the traditionally developed industrial (Fig. 2.13), mining (Fig. 2.12) and commercial belt of the study area, located in the Delta proper of the Lower Ganga Plain and the mineralized south-eastern portion of the Chota Nagpur Plateau, and adjoining regions (Fig. 2.6 and Fig. 2.4).

The areas of the next category (high) of the levels of the development also form two distinct patches : one comprises Patna district of the Bihar Plain and the second consists of Sundergarh and Sambalpur districts in the north-western portion of the Orissa Highland (Fig. 2.4). The first is the only exception in the Bihar Plain and it owes its development to the administrative, education and medical services it provides to the adjoining less developed and less urbanized parts of the Plain. The second zone (Sundergarh-Sambalpur) is an area of new development of industries (Fig. 2.13) and mining (Fig. 2.12). These areas are also well served by transportation networks (Fig. 2.17).

The regions of the lowest level of economic development include all the districts of North Bihar Plain. They are devoid of industrial development (Fig. 2.13) and are characterized by low urbanization (Fig. 2.16). Low level of economic development is also found at four other areas scattered in the north-western (Palamu) and north-eastern portion of the Chota Nagpur Plateau (Fig. 2.4), north-eastern (Mayurbhanj) and the south-western part (Bolangir and Kalahandi) of the Orissa Highlands. These areas are also characterized by low urbanization and lack adequate mining and industrial activities. All the areas of the low levels of economic development have agriculture as their main source of livelihood (Fig. 2.7).

The other areas, i.e., most of the lower Ganga Plain other than the Delta proper and the Himalayan tract, the Chota Nagpur Plateau, the Utkal Coastal Plain and the Orissa Highlands have medium level of

economic development, both medium, high and Medium low categories encircle the areas of the highest level of economic development (Fig. 5.1). The southern portion of the Utkal Coastal Plain and the Orissa Highlands are the only exceptions to this rule which are separated from the more developed areas by one of the least developed zone.
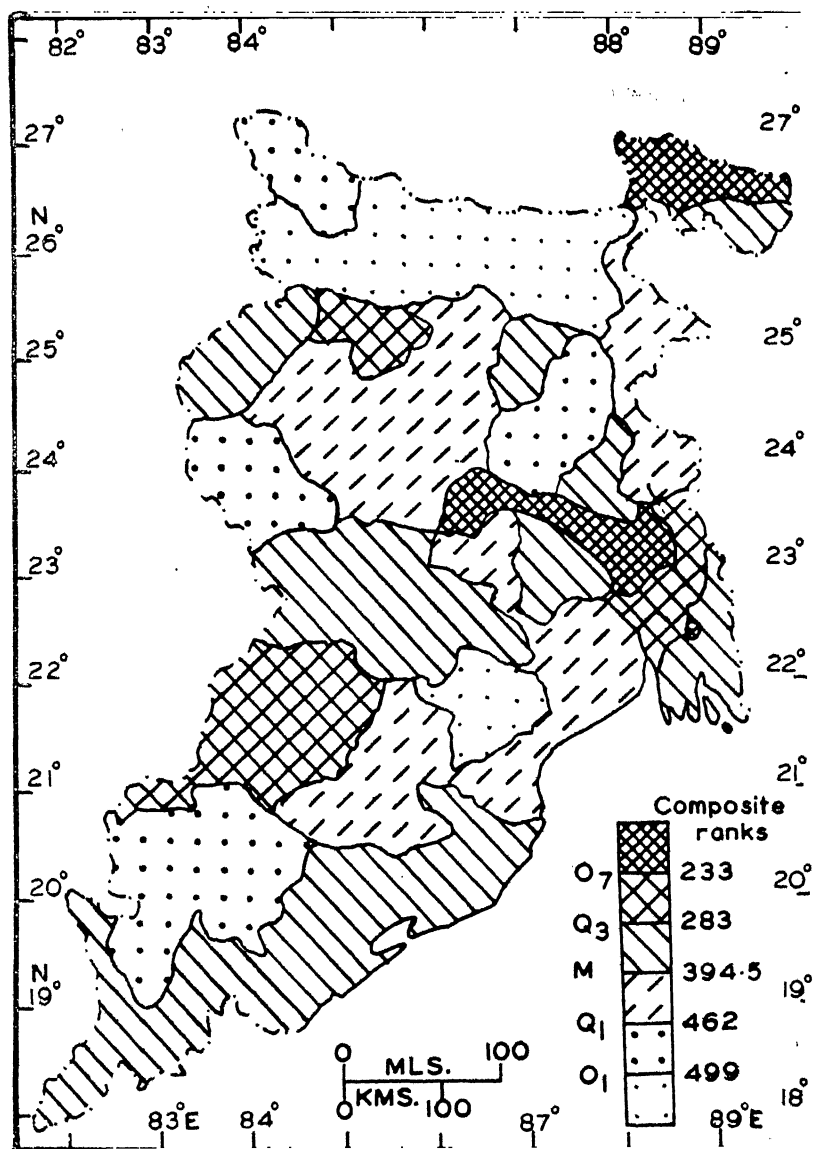
Fig. 5.1 : Bihar, Orissa & W. Bengal—Levels of Economic Development (based on 16 indices), 1970-71
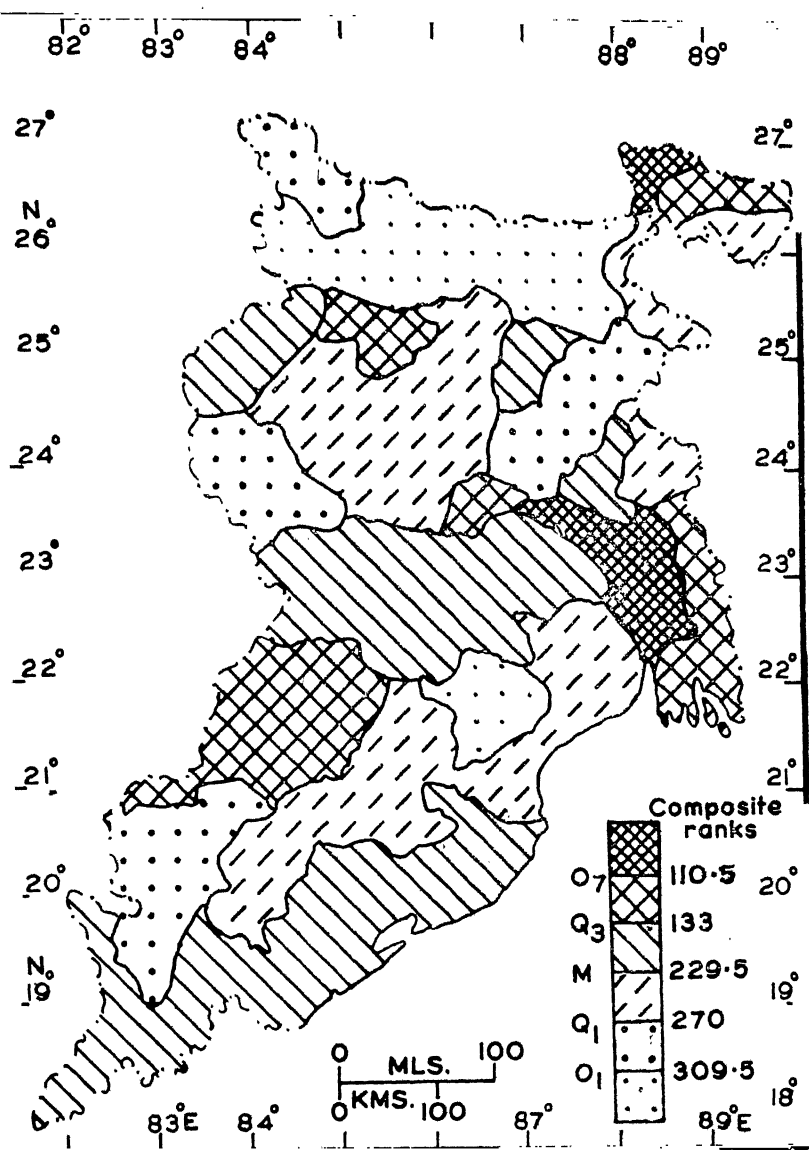
Fig. 5 2 : Bihar, Orissa & West Bengal—Levels of Economic Development (based on 9 indices), 1970-71

The above discussion does not seem to give a good picture of the levels of economic development in Eastern India. It does not show clear relationship with industrialized areas or with areas of commercial activities or commercial farming. This is probably due to the fact that equal weightage has been given to all the indicators. Consequently agricultural activity is overemphasized on account of a number of indices (4) for it, resulting in the higher levels of development for less developed sectors.

TABLE 5.3 : **Districts according to Levels of Economic Development (9 Indices) 1970-71**

Category	Median, Quartile, Octile	Value of Composite Rank	Name of the Districts
I (Very High)	Above O_7	Below 110.5	Calcutta, Darjeeling, Burdwan, Howrah and Hooghly.
II (High)	Q_3—O_7	133 — 110.5	Sundergarh, Dhanbad, Jalpaiguri, Nadia, Sambalpur and Patna.
III (Med. High)	M—Q_3	229.5 — 133	24-Parganas, Ranchi, Cuttack, Puri, Singhbhum, Ganjam, Shahabad, Bankura, Birbhum, Bhagalpur, Purulia and Koraput
IV (Med. Low)	Q_1—M	270 — 229.5	Cooch Behar, Mongher, Midnapore, Murshidabad, Hazaribagh, Keonjhar, W. Dinajpur, Dhenkanal, Gaya, Balasore and Baudh Khondmals
V (Low)	O_1—Q_1	309.5 — 270	Malda, Bolangir, Santal Parganas, Champaran, Palamu and Kalahandi.
VI (Very Low)	Below O_1	Above 309.5	Purnea, Saharsa Darbhanga, Muzaffarpur, Saran and Mayurbhanj.

Moreover, since the pressure of population has been emphasized in almost all the indicators, the districts having a dense population have been relegated to the bottom. In order to avoid these flaws, composite ranks for each district were calculated with the help of the ranks of the important economic activities only, e.g., agriculture, industry, trade and commerce, etc. Consequently the sixteen indices have been reduced to nine indices. They are as follows :

    (i) Percentage of urban population in total population,
    (ii) Percentage of workers in total population,
    (iii) Percentage of workers engaged in non-agricultural activities,
    (iv) Levels of agricultural development,
    (v) Levels of industrial development,
    (vi) Percentage of workers engaged in trade and commerce,

 (vii) Hospital beds per lakh of population,

 (viii) Percentage of literate persons, and

 (ix) Levels of transport development.

  Again 'W' has been calculated to determine the degree of association among the nine indices finally selected. It has been found that the degree of association is greater among the nine indices (W=.50) as compared to the sixteen indices calculated earlier (W=.28). However, both are significant at .001 level (the values of χ^2 are 202.5 and 201.6 respectively).[11]

  The districts were again categorized into six levels of economic development with the help of Median, Quartiles and Octiles. They are as given in Table 5.3.

  Fig. 5.2 and Table 5.3 reveal that Calcutta, Darjeeling, Burdwan, Howrah and Hooghly districts of West Bengal have recorded the highest levels of development (under very high category), followed by Patna and Dhanbad districts of Bihar; Jalpaiguri, Nadia and 24-Parganas of West Bengal; and Sundergarh and Sambalpur districts of Orissa under high category. In contrast, Saran Darbhanga, Muzaffarpur, Purnea and Saharsa districts of Bihar and Mayurbhanj district of Orissa fall in the category of lowest level of development, while Champaran, Santal Parganas and Palamu districts of Bihar; Malda district of West Bengal; and Bolangir and Kalahandi district of Orissa are only slightly better. Other districts fall in the category of average levels of development on either side of median

  The study based on the nine indices (Fig. 5.2) exhibits almost the similar pattern with slight variation from that of the sixteen indices (Fig. 5.1).

  The most developed districts form one compact block around Calcutta, consisting of the district of Calcutta, Howrah, Hooghly and Burdwan. The only area outside this compact block is Darjeeling district. Also all the most developed areas lie in West Bengal.

  The next category of districts are completely scattered : some are near the most developed areas around Calcutta and Darjeeling, viz., Nadia and 24-Parganas and Jalpaiguri, other districts of this category are two in Bihar—Patna (administrative and educational centre) and Dhanbad (industrial and mining centre). Two districts of Orissa—Sundergarh and Sambalpur (industrial and mining areas) also fall in this category.

  The third category consists of mainly mineralized and industrialized belts of Chota Nagpur Plateau and adjoining areas in Orissa Highlands, namely, Ranchi, Singhbhum, Bankura, Birbhum, Purulia, Cuttack, Puri, Ganjam and Koraput. Some districts of South Bihar Plain—Shahabad and Bhagalpur also fall in this category.

  The fourth category of districts is found in South Bihar, parts of Orissa Highlands and Basins and in the Lower Ganga Plain. In Bihar

Mongher, Gaya and Hazaribagh ; in Orissa Keonjhar, Dhenkanal, Balasore and Baudh Khondmals ; and in West Bengal, Cooch Behar, Midnapore, Murshidabad and West Dinajpur belong to this category.

The fifth category of districts is found in north-western and south-western corner of Bihar (Champaran and Palamu respectively) and south western portion of Orissa (Bolangir and Kalahandi) as well as one small districts of West Bengal (Malda).

The districts marked by least development are found in the predominantly argricultural North Bihar Plain. These include Saran, Muzaffarpur, Darbhanga, Saharsa and Purnea.

Thus the developed areas are around the hub of commercial activities (Calcutta), industrial, mining and/or plantation areas. And the least developed areas are predominantly agricultural areas.

Change in the Levels of Development

So far as the change in the levels of economic development during 1960-61 to 1970-71 is concerned, it has been examined with the help of fourteen indices only. This was because the data for surfaced road length per hundred sq. kilometres and per lakh of population were not available for both the years, 1960-61 and 1970-71.

The districts were ranked on the basis of positive or negative change in the values of the fourteen indices (Appendix I) and by summing them up composite ranks were obtained (Table 5.4). 'W' has also been calculated for the change in the fourteen indices. The value of W (0.19) is significant even at .001 level (the value of χ^2 is 119.70).

In order to know the spatial pattern of change in the levels of economic development, the districts have been grouped into six categories with the help of Median, Quartiles and Octiles.

Fig. 5.3 and Table 5.5 indicate that Dhanbad, Ranchi and Singhbhum districts of Bihar ; Calcutta district of West Bengal ; and Sundergarh and Sambalpur districts of Orissa have recorded the highest growth in the levels of development (very high category). This category is followed by Darjeeling and Burdwan district of West Bengal ; and Cuttack, Puri, Keonjhar and Koraput districts of Orissa, which fall under high category. On the other hand, Saran, Darbhanga, Bhagalpur and Purnea districts of Bihar and Murshidabad district of West Bengal recorded the lowest change in their levels of development (very low category); followed by Champaran and Palamu districts of Bihar ; and Cooch Behar, West Dinajpur, Birbhum and Howrah districts of West Bengal which fall under low category. Other districts recorded medium change in their levels of economic development.

As stated earlier, in order to avoid the misleading effects of over-emphasis on agricultural activity on the change in the levels of economic

TABLE 5.4 : **Calculation of 'W' for Change in the Levels of Economic Development, 1960-61 to 1970-71**

Districts	14 Indices		9 Indices	
	Composite Ranks (Rj)	$\left(Rj-\dfrac{Rj}{N}\right)^2$	Composite Ranks (Rj)	$\left(Rj-\dfrac{Rj}{N}\right)^2$
1	2	3	4	5
Patna	368.5	1901	240	876
Gaya	362	1376	239	818
Shahabad	369.5	1989	250	1568
Saran	425	10020	297.5	7586
Champaran	379.5	2981	256	2079
Muzaffarpur	376	2611	250	1568
Darbhanga	438	12792	311	10120
Mongher	414.5	8028	289.5	6257
Bhagalpur	441.5	19426	307.5	9428
Saharsa	353.5	818	264	2873
Purnea	485	25632	337	16028
Santal Parganas.	356	967	241.5	967
Palamu	400.5	5315	282.5	5198
Hazaribagh	285.5	1552	182.5	778
Ranchi	179	21287	104	11321
Dhanbad	182	20420	101	11968
Singhbhum	201	15351	130	6464
Darjeeling	263.5	3770	166.5	1927
Jalpaiguri	282.5	1798	173.5	1362
Cooch Behar	396	5055	271	3672
West Dinajpur	394	4775	268,5	3376
Malda	366.5	1731	241	936
Murshidabad	426.5	10323	295	7157
Nadia	315.5	88	189	458
24-Parganas	329	17	180	924
Howrah	397.5	5271	238.5	790
Calcutta	144	32725	118.5	8446

TABLE 5.4—Contd.

1	2	3	4	5
Hooghly	369.5	1989	221.5	123
Burdwan	273.5	2642	170	1632
Birbhum	391.5	4369	256	2079
Bankura	344.5	384	230	384
Midnapore	367	1806	238	762
Purulia	282	1840	159.5	2591
Sambalpur	183	20136	99	12410
Sundergarh	164	25889	85.5	15600
Keonjhar	251.5	5388	145	4277
Mayurbhanj	348	534	226.5	259
Balasore	326.5	3	209	196
Cuttack	244	6545	136.5	5461
Dhenkanal	314.5	108	198.5	142
Baudh Khondmals	346.5	467	229.5	365
Bolangir	302.5	502	185	645
Kalahandi	319.5	29	201.5	79
Koraput	257.5	5453	152	58
Ganjam	276	2391	169	1714
Puri	251.5	5388	143.5	4476

	$\dfrac{14945}{46}$	S=304282	$\dfrac{96795}{46}$	S=178265
	$\dfrac{\Sigma Rj}{N} = 324.9$		$\dfrac{\Sigma Rj}{N} = 210.42$	

development, it has also been studied with the help of the nine indices. The value of W has been found greater (.27) than that for the fourteen indices (.19) examined earlier. The result is significant even at .001 level (the value of $X^2 = 109.35$. The districts have again been grouped into six categories as given in Table 5.6.

TABLE 5.5 : **Classification of Districts on the basis of Change in Levels of Economic Development (14 Indices), 1960-61 to 1970-71**

Category	Median, Quartile, Octile	Value of composite Rank	Name of the Districts
I (Very High)	Above O_7	Below 201	Calcutta, Sundergarh, Ranchi, Dhanbad, Singhbhum and Sambalpur.
II (High)	Q_3—O_7	273.5—201	Cuttack, Keonjhar, Puri, Koraput, Darjeeling and Burdwan.
III (Med. High)	M—Q_3	345.5—273.5	Ganjam, Bolangir, Dhenkanal, Kalahandi, Balasore, Jalpaiguri, Nadia, 24-Parganas, Bankura, Purulia and Hazaribagh.
IV (Med. Low)	Q_1—M	379.5– 345.5	Baudh Khondmals, Mayurbhanj, Malda, Midnapore, Hooghly, Saharsa, Santal Parganas, Gaya, Patna, Shahabad and Muzaffarpur.
V (Low)	O_1—Q_1	414—379.5	Champaran, Palamu, Birbhum West Dinajpur, Cooch Behar, Howrah and Mongher.
VI (Very Low)	Below O_1	Above 414	Saran, Darbhanga, Bhagalpur, Purnea and Murshidabad.

Fig. 5.4 and Table 5.6 reveal that Dhanbad, Ranchi and Singhbhum districts of Bihar ; Calcutta district of West Bengal ; and Sundergarh and Sambalpur districts of Orissa experienced the highest change in the levels of economic development (under very high category). Purulia district of West Bengal ; and Cuttack, Puri, Keonjhar and Koraput districts of Orissa come next and fall under high category. At the bottom on the list, Saran, Darbhanga, Mongher, Bhagalpur and Purnea districts of Bihar and Murshidabad district of West Bengal recorded the least growth in the levels of economic development (under very low category). The next higher category includes Champaran, Saharsa and Palamu districts of Bihar ; and Cooch Behar, West Dinajpur and Birbhum districts of West Bengal (under low category). The other districts have exhibited medium degrees of change in economic development.

Spatial Pattern of Change in the Levels of Economic Development

Thus the highest improvement in the levels of economic development during 1961-71 has been recorded in the industrialized and mineralized belt of the Chota Nagpur Plateau and the Orissa Highlands (Fig. 5.4). The
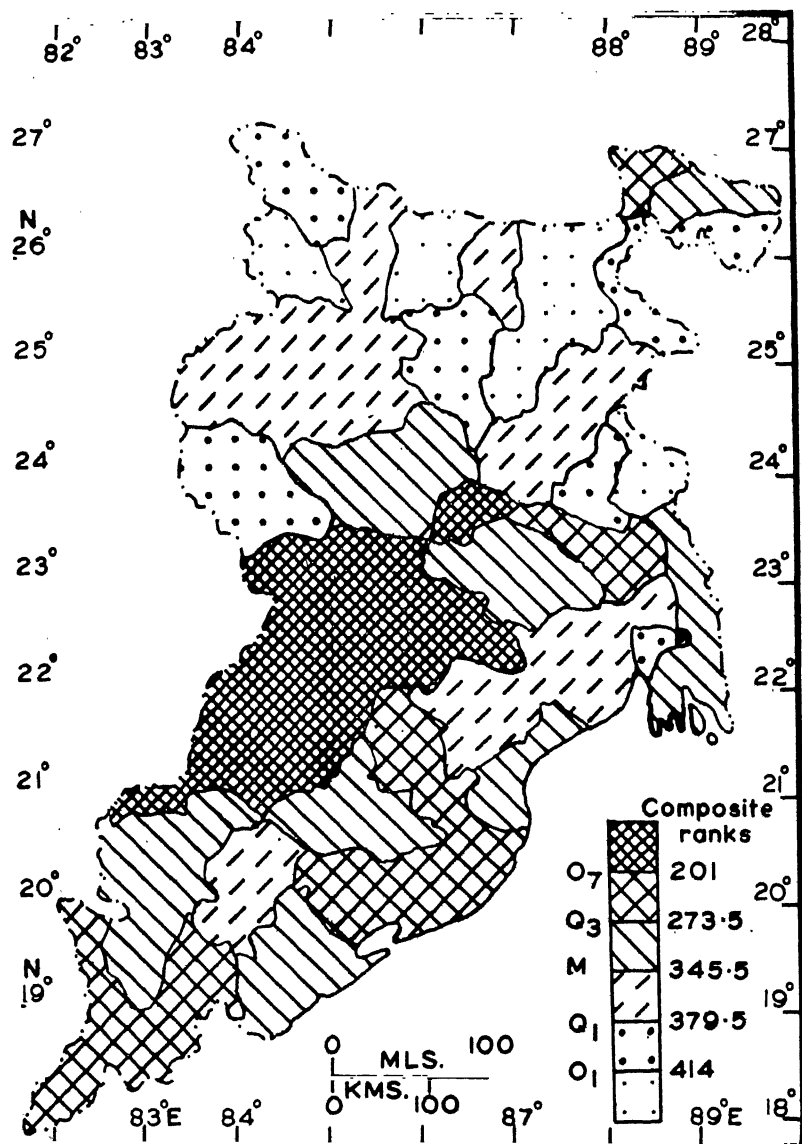
Fig. 5.3 : Bihar Orissa & W. Bengal—Change in Levels of Economic Development (based on 14 indices), 1960-61 to 1970-71

second category (high) of the increment in the levels of the development occurred in the southern portions of the Utkal Coastal Plain and the Orissa Highlands (Fig. 2.4) and in that portion of the Lower Ganga Plain which is attached with the Chota Nagpur Plateau (Burdwan).

Major parts of the Bihar Plain and the Lower Ganga Plain have recorded the lowest improvement in their levels of economic development during 1961-71. Surprisingly enough the areas adjacent to Calcutta (excluding Calcutta) experienced one of the lowest positive change in the levels of the economic development. The areas of plantation agriculture (Darjeeling-Jalpaiguri zone) also have recorded medium change. Portions of the Utkal Plain and the Orissa Highlands (between the industrialized

TABLE 5.6 : **Classification of the Districts on the basis of Change in Levels of Economic Development (9 Indices), 1960-61 to 1970-71**

Category	Median, Quartile, Octile	Value of Composite rank	Name of the Districts
I (Very High)	Above O_7	Below 130	Sundergarh, Sambalpur, Ranchi, Dhanbad, Singhbhum and Calcutta.
II (High)	$Q_3 - O_7$	166.5 – 130	Cuttack, Puri, Keonjhar, Koraput and Purulia.
III (Medium High)	$M - Q_3$	224 –166.5	Darjeeling, Burdwan, Jalpaiguri, 24-Parganas, Nadia, Hooghly, Ganjam, Bolangir, Dhenkanal, Kalahandi, Balasore and Hazaribagh.
IV (Medium Low)	$Q_1 - M$	256 – 224	Mayurbhanj, Baudh Khondmals, Bankura, Midnapore, Howrah, Malda, Gaya, Patna, Santal Parganas, Shahabad and Muzaffarpur.
V (Low)	$O_1 - Q_1$	289.5 – 256	Champaran, Saharsa, Palamu, Birbhum, West Dinajpur and Cooch Behar.
VI (Very Low)	Below O_1	Above 289.5	Mongher, Bhagalpur Purnea, Darbhanga, Saran, Murshidabad.

part and the coastal tract also experienced less improvement in their levels of economic development during 1961-71 decade.
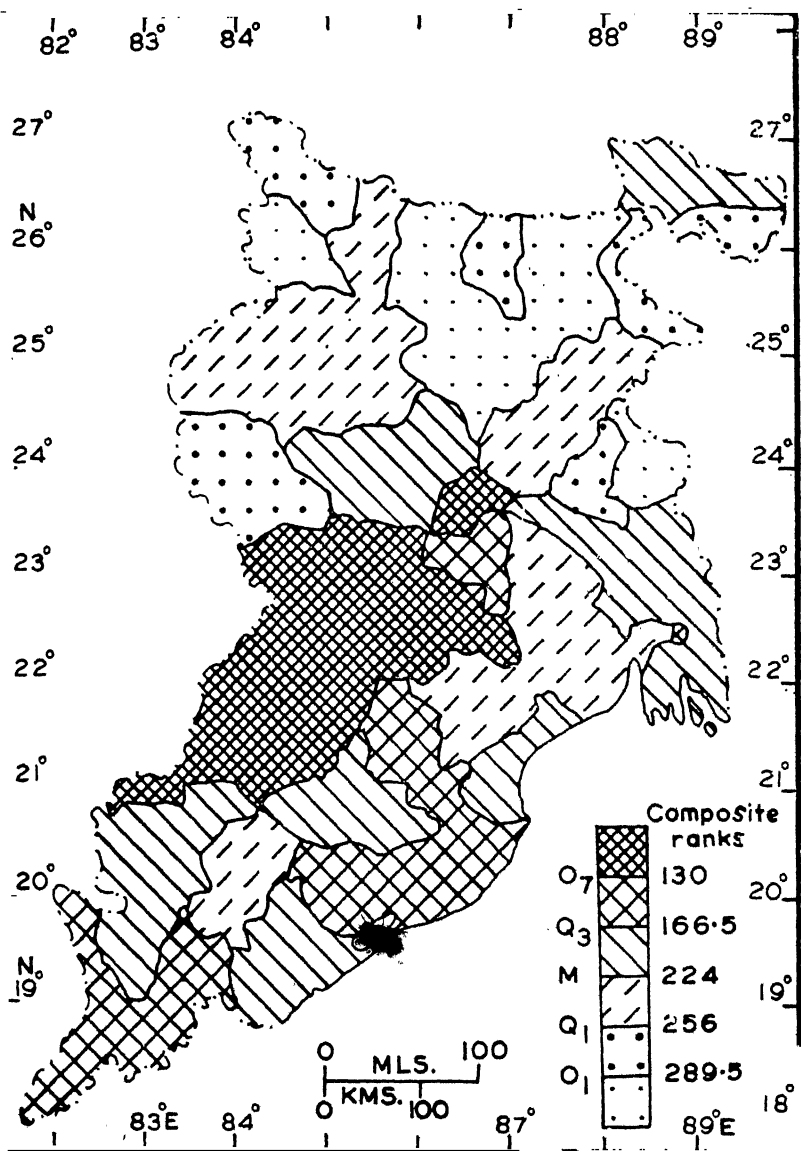
Fig, 5.4 : Bihar, Orissa & W. Bengal—Change in Levels of Economic Development (based on 9 indices), 1960-61 to 1970-71

The two studies give almost similar if not identical spatial pattern of change in the levels of development. Only a few districts have moved up and others gone down in the proportion of change in the levels of economic development during the period 1960-61 to 1970-71. Purulia district of West Bengal has moved up from medium high category to high category while Darjeeling and Burdwan have moved down from high to medium high category. Similarly, Mongher has moved down from low to very low category while Saharsa has moved down from medium low to low category.

It is obvious from the above studies of change in the levels of economic development that it has been higher either in already developed districts or in newly industrialized areas, while the areas of least growth in the levels of economic development continue to be those districts which were lower on the ladder of economic development in 1970-71, viz., agricultural plain areas and the plateau areas devoid of mineral wealth and consequently lacking in the development of mining and industrial activities.

From the above analyses it can be concluded that industrial, commercial and mining areas and the areas of plantation agriculture, such as Calcutta, Howrah, Hooghly, Burdwan, Sundergarh, Dhanbad, Sambalpur, Darjeeling and Jalpaiguri, have higher levels of economic development in 1970-71. In contrast, the agricultural areas are characterized with the lowest level of economic development. A change in the levels of economic development during 1960-61 to 1970-71 has been largely confined to the newly industrialized areas such as Sundergarh, Sambalpur and Ranchi, etc., and areas of mining activities particularly of Orissa though the already developed areas have continued to improve their levels of economic development during 1960-61 to 1970-71 period.

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6

Relationship between Levels of Economic Development and Migration

THE study of type and strength of relationship between two or among more than two variables is crucial to any research.[1] Although the concept of spatial association is central to the science of geography,[2] the techniques usually employed to recognise and describe such relationships are often somewhat less rigorous. The degree of areal association in the occurrence of related phenomena have often been discovered by comparing the patterns of distribution of those phenomena on maps, either by placing them side by side or overlaying them upon one another. But the human eye is not always a very precise assessor of the strength of spatial relationship. The relationships, suspected on theoretical and intuitive grounds, or from an examination of empirical cartographic evidence, must be examined much more rigorously.

The measurement of covariation can be approached in a preliminary way by means of scatter diagram.[3] If enough information is available for constructing maps and tables, it is usually possible to plot the same data upon a graph to form a scatter diagram. It is the pattern of this swarm that enables a researcher to judge the nature of the relationship. Such judgment is an essential preliminary to its proper measurement. When the points move within a narrow lane, the correlation would be high, when the points are widely scattered, correlation would be low, and when the scatter is purely random, the correlation is negligible. Only when all the points fall right on the regression line, the correlation would be perfect.[4]

Although the scatter diagram yields no mathematical measure of correlation, it does indicate, whether the relationship exists at all or not, whether or not the relationship is consistent over the entire range, whether the relationship is strong or weak, whether the relationship is positive or negative, and whether the relationship is rectilinear (linear) or more complex. It is an indispensable tool in studying correlation as does the

frequency graph in the processing of univariate data.[5]   It provides a bird's eye view of the types of relationship between two variables.

Relationship between Levels of Economic Development and Total Migration

In order to show the nature of association between the levels of economic development in 1970-71 and the percentage of total migrants in 1971, a scatter diagram has been constructed (Fig. 6.1). The diagram indicates a weak positive relationship between the levels of economic development and the percentage of total migrants in 1971.

Spearman's Rank Coefficient of Correlation (r_s) has also been calculated to estimate the degree of relationship between the two. The Spearman's rank correlation coefficient was calculated with the help of the following formula, which is suitable for tied observations :[6]

$$r_s = \frac{\Sigma x^2 + \Sigma y^2 - \Sigma d^2}{\sqrt{\Sigma x^2 \; \Sigma y^2}}$$

where $$\Sigma x^2 = \frac{N^3 - N}{12} - \Sigma T_x$$

and $$\Sigma y^2 = \frac{N^{12} - N}{12} - \Sigma T_y$$

For calculating r_s with help of this formula, the districts of the area under study were ranked for the levels of economic development in 1970-71 on the basis of the nine indices (denoted in the table as x), and the percentage of migrants in total population (denoted in the table as y) (Table 6.1). Σd^2 was obtained by summing up the squared deviations of the two ranks (x and y) (Table 6.1). ΣT_x and ΣT_y were obtained in the same way as in the case of calculation of W (Chapter 5, pp. 150-151). To make the process clear here, there is only one tie with two observations in the share of total migrants in 1971 :

$$\Sigma T_x = \frac{2^3 - 2}{12} = .5$$

There is no tied observation in the rank of the levels of economic development in 1971. Thus :

$$\Sigma x^2 = \frac{N^3 - N}{12} = \Sigma T_x$$

$$= \frac{46^3 - 46}{12} = \frac{2^3 - 2}{12}$$

$$= 8107.5 - .5 = 8107$$
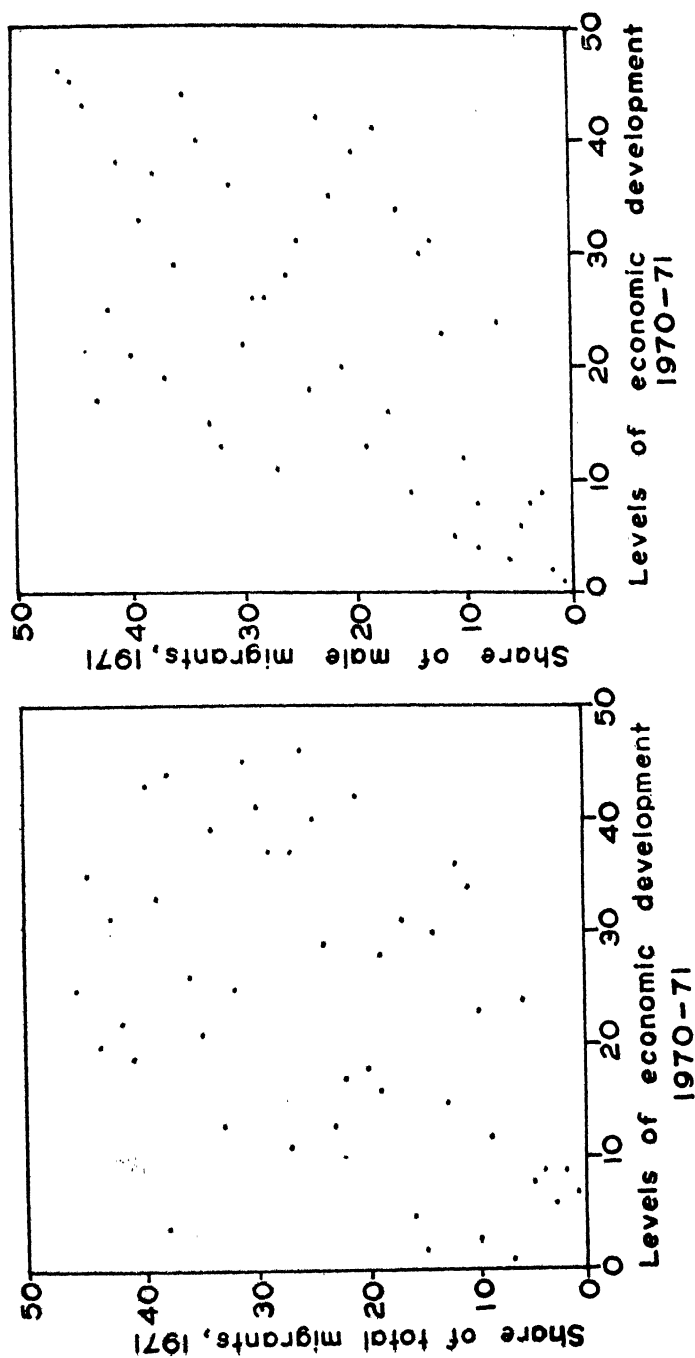
Fig. 6.2 : Rank Order Relationship between
Economic Development and Migration

Fig. 6.1 : Rank Order Relationship between
Economic Development and Migration

and $\Sigma y^2 = \dfrac{N^3 - N}{12} = \Sigma T_y$

$= \dfrac{46^3 - 46}{12} - 0$

$= 8107.5$

Thus $r_s = \dfrac{\Sigma x^2 + \Sigma y^2 - \Sigma d^2}{\sqrt{\Sigma x^2 \ \Sigma y^2}}$

$= \dfrac{8107 + 8107.5 - 8758.5}{\sqrt{8107 \times 8107.5}}$

$= -\dfrac{7456}{2 \times 8107.25} = \dfrac{7456}{16214.5}$

$= .46$

The significance of the value of r_s (0.46) has been tested with the help of the following formula, which is suitable for large samples (N is 10 or larger).[7]

$$t = r_s \sqrt{\dfrac{N-2}{1-r_s^2}}$$

With $df = N-2$

TABLE 6.1 : **Calculation of Spearman's Rank Correlation Coefficient for the Level of Economic Development in 1970-71 (x) and the percentage of Total Migrants, 1971 (y)**

Districts	X	Y	di	di²
Patna	11	27.5	—16.5	272.25
Gaya	32	39	—7	49
Shahabad	18	22	—4	16
Saran	46	26	20	400
Champaran	38	27.5	10.5	110.25
Muzaffarpur	45	31	14	196
Darbhanga	43	40	3	9
Mongher	25	32	—7	49
Bhagalpur	21	35	—14	196
Saharsa	44	38	6	36
Purnea	41	30	11	121
Santal Parganas	37	29	8	64

TABLE 6.1—*Contd.*

Districts	X	Y	di	di²
Palamu	39	25	14	196
Hazaribagh	28	18	10	100
Ranchi	13	23	−10	100
Dhanbad	7	1	6	36
Singhbhum	16	19	−3	9
Darjeeling	2	15	−13	169
Jalpaiguri	9	2	7	49
Cooch Behar	24	6	18	324
West Dinajpur	30	17	13	169
Malda	35	45	−10	100
Murshidabad	27	46	−19	361
Nadia	9	4	5	25
24-Parganas	12	9	3	9
Howrah	4	37	−33	1089
Calcutta	1	7	−6	36
Hooghly	5	16	−11	121
Burdwan	3	10	−7	49
Birbhum	20	44	24	576
Bankura	19	41	22	484
Midnapore	26	36	−10	100
Purulia	22	42	−20	400
Sambalpur	9	5	4	16
Sundergarh	6	3	3	9
Keonjhar	29	14	15	225
Mayurbhanj	42	21	21	441
Balasore	33	24	9	81
Cuttack	14	33	−19	361
Dhenkanal	31	43	−12	144
Baudh Khondmals	34	11	23	529
Bolangir	36	12	24	576
Kalahandi	40	34	6	36
Koraput	23	8	15	225
Ganjam	17	20	−3	9
Puri	15	13	2	4

$\Sigma d^2 = 8758.5$

For large sample (N), the value defined by the formula is distributed as student's[8] t with df=N—2. The value of t found here is only 3.436 which is significant at .005 and .01 levels in one and two tailed tests respectively, but it is not significant as .0005 and .001 levels in one and two tailed tests respectively.[9] It means that there is a weak positive correlation between the levels of economic development in 1970-71 and the percentage of total migrants in 1971. The variation in the levels of economic development is able to explain only 21% variation in the percentage of total migrants. Moreover, since the power of efficiency of the Spearman's rank correlation coefficient is about 91% as compared to the most powerful parametric correlation, the Pearson[10] r, the explained variance will vary between 19.3 to 23 per cent.

TABLE 6.2 : **Comparative Picture of the Districts Classified on the basis of the Levels of Economic Development 1970-71 and the Percentage of Total Migrants in 1971.**

Category	Levels of Economic Development	Percentage of total migrants
I (Very High)	Calcutta, Darjeeling, Burdwan, Howrah and Hooghly.	Dhanbad, Jalpaiguri, Sundergarh, Nadia, Sambalpur and Cooch Behar.
II (High)	Sundergarh, Dhanbad, Jalpaiguri, Nadia, Sambalpur and Patna.	Calcutta, Koraput, 24-Parganas, Burdwan, Baudh Khondmals and Bolangir.
III (Med. High)	24-Parganas, Ranchi, Cuttack, Puri, Singhbhum, Ganjam, Shahabad, Bankura, Birbhum, Bhagalpur and Purulia.	Puri, Keonjhar, Darjeeling, Hooghly, West Dinajpur, Hazaribagh, Singhbhum, Ganjam, Mayurbhanj, Shahabad and Ranchi,
IV (Med. Low)	Cooch Behar, Mongher, Midnapore, Murshidabad, Hazaribagh, Keonjhar, West Dinajpur, Dhenkanal, Gaya, Balasore and Baudh Khondmals.	Balasore, Palamu, Saran, Patna, Champaran, Santal Parganas, Purnea, Muzaffarpur, Mongher, Cuttack and Kalahandi.
V (Low)	Malda, Bolangir, Santal Parganas, Champaran, Palamu and Kalahandi.	Bhagalpur, Midnapore, Howrah, Saharsa, Gaya, Darbhanga and Bankura.
VI (Very Low)	Purnea, Saharsa, Darbhanga, Muzaffarpur, Saran and Mayurbhanj.	Purulia, Dhenkanal, Birbhum, Malda and Murshidabad.

Since a large share of the total migrants consists of female migrants who migrate mainly due to social causes, the degree of correlation between the levels of economic development and the share of total migrants is expected to be weak.

Table 6.2 and comparison of figures 5.2 and 6.7 brings out clearly the nature of relationship between the levels of economic development in 1970-71 and the percentage of total migrants in 1971.

The north-western portion of the Orissa Highlands (Sundergarh and Sambalpur districts) fall in very high category in both the cases, the levels of economic development in 1970-71 and the share of migrants to total population in 1971. Dhanbad-Burdwan-Calcutta zone, including Nadia, an area of high levels of economic development also has higher percentage of migrants. Only Howrah and Hooghly deviate appreciably from this pattern. Both were in the first category of the levels of economic development but are in the fifth and third categories respectively of the share of migrants. The third area of the higher levels of economic development in the north-eastern section of the study area, near the Himalayan tract (Fig. 2.3) of the Lower Ganga Plains (Darjeeling-Jalpaiguri) (Fig. 2.4), also has higher share of the migrants, although they are not in the identical categories. Darjeeling falls in the first category of the levels of economic development but is in third category of the percentage of migrants. In comparison with it Jalpaiguri and Cooch Behar are in the second and fourth categories of the former but they are in the first category of the latter.

In the same way the south-western portion of the Bihar Plains (Shahabad), the southern part of the Chota Nagpur Plateau (Ranchi and Singhbhum) and the southern section of the Utkal Coastal Plain (Fig. 2.4) (Puri and Ganjam) are in the third category in both the cases, but at the same place the east-central part of the Bihar Plain (Mongher), west central section of the Lower Ganga Plain (Birbhum), south-eastern fringe of the Chota Nagpur Plateau (Purulia and Bankura) and the south-western tip of the Orissa Highlands (Koraput), which are in the third category of the levels of economic development are in the 5th, 6th, 6th 5th and second categories respectively of the share of migrants to the total population.

Patna district, which is more developed (in the second category) is in the fourth category of the share of migrants together with Champaran. Saran, Muzaffarpur and Mongher forming one compact block. In general, the North Bihar Plains, which is on the lowest ladder of the levels of economic development have higher share of the migrants in comparison to its levels of economic development. The areas of the Orissa Highlands, the Utkal Coastal Plain, parts of the Chota Nagpur Plateau (Palamu, Hazaribagh and Santal Parganas) have higher share of the migrants in

comparison to their levels of economic development.   In contrast, the major parts of the South Bihar Plain and the Calcutta-Howrah-Burdwan zone has lower share of the migrants.   Similarly, Darjeeling, Birbhum, Purulia, Bankura and Midnapore have the lower percentage of migrants while Jalpaiguri, Cooch Behar, West Dinajpur and Nadia have higher proportion of the migrants in comparison to their levels of economic development.

From the above discussion it is obvious that the share of total migrants does not have strong positive relationship with the levels of economic development.   The more developed areas in general have higher share of migrants, but the less and even the least developed areas such as Bihar Plain and northern portion of the Chota Nagpur Plateau, etc., also have higher share of migrants.   In contrast, some of the highly developed areas such as Howrah, Hooghly and Darjeeling districts are characterized with lower share of the migrants.

The main cause behind such a pattern of relationship is that majority (two-thirds) of the total migrants are composed of females, who rarely migrate on account of economic causes, rather they move mainly due to social and cultural reasons.

Relationship between Levels of Economic Development and Male Migrations

Another scatter diagram has been constructed to show the nature of relationship between levels of economic development in 1970-71 and the percentage of male migrants in total migrants (Fig. 6.2).   This scatter diagram shows a better positive relationship.

The value of Spearman's rank correlation coefficient for the level of economic development in 1970-71 and the share of male migrants in 1971 is 0.65.   It is significant even at .0005 and .001 levels in one and two tailed tests respectively (the value t is 5.67).   The variation in the level of economic development is able to explain 42% of the variation in the share of male migrants.   However, the explained variance may vary between 38.5 and 46.7 per cent as the Spearman's correlation coefficient is less accurate as mentioned earlier.   This clearly indicates that the migration of the males is positively related with the levels of economic development.

It is obvious from the comparison of Figs. 5.2 and 6.8 and Table 6.3 that the three zones of very high levels of economic development—the Calcutta-Burdwan-Dhanbad zone of the southern part of the Lower Ganga Plain and the south-eastern portion of the Chota Nagpur Plateau ; Sundergarh-Sambalpur zone of the north-western section of the Orissa Highlands ; and the Darjeeling, Jalpaiguri zone in the north-eastern corner of the Lower Ganga Plain—also have very high share of the male migr-ants. However, all the districts of these zones do not fall in the identical

TABLE 6.3 : **Comparative Picture of the Districts Classified on the basis of Levels of Economic Development in 1970-71 and the Share of Male Migrants, 1971**

Category	Levels of Economic Development	Percentage of Male Migrants
I (Very High)	Calcutta, Darjeeling, Burdwan, Howrah and Hooghly.	Calcutta, Darjeeling, Jalpaiguri Dhanbad and Sundergarh.
II (High)	Sundergarh, Dhanbad, Jalpaiguri, Nadia, Sambalpur and Patna.	Burdwan, Cooch Behar, Sambalpur, Howrah, 24-Parganas and Hooghly.
III (Med. High)	24-Parganas, Ranchi, Cuttack, Puri, Singhbhum, Ganjam, Shahabad, Bankura, Birbhum, Bhagalpur and Purulia.	Koraput, Keonjhar, Baudh Khondmals, Cuttack, Kalahandi, Mayurbhanj, West Dinajpur, Nadia, Birbhum, Malda, Singhbhum and Purnea.
IV (Med. Low)	Cooch Behar, Midnapore, Murshidabad, West Dinajpur, Keonjhar, Dhenkanal, Balasore and Baudh Khondmals.	Ganjam, Dhenkanal, Bolangir, Puri, Midnapore, Murshidabad, Purulia, Hazaribagh, Patna, Ranchi and Palamu.
V (Low)	Malda, Santal Parganas, Champaran, Palamu and Kalahandi.	Bankura, Balasore, Saharsa, Santal Parganas, Gaya and Bhagalpur.
VI (Very Low)	Purnea, Saharsa, Darbhanga, Muzaffarpur, Saran and Mayurbhanj.	Champaran, Mongher, Sahabad, Darbhanga, Muzaffarpur and Saran.

categories in both the cases, the levels of economic development and share of the male migrants. Only Calcutta, Sambalpur, 24-Parganas and Darjeeling districts are in the identical categories. Others are in the adjoining categories. For example, Dhanbad, Sundergarh and Jalpaiguri, which are in the second (high) category of the levels of economic development, are in the first category of the share of male migrants. In the same way, Howrah, Hooghly and Burdwan are in first (very high) category of the levels of economic development but they are in the second category of the share of male migrants.

The plain areas, particularly the Bihar Plain, except the north-eastern part (Saharsa and Purnea) are either in the lowest category in both the cases or have lower share of the male migrants even in those areas which have comparatively higher levels of economic development. Patna, Shahabad, Mongher and Bhagalpur districts are the notable examples. The northern and southern portions of the Lower Ganga Plain have higher share of male migrants in comparison to their levels of economic development. Nadia and Murshidabad are the only exceptions. The former has the lower share, the latter is in the identical category. Except Palamu and Dhanbad, the Chota Nagpur Plateau also has either lower share of male migrants or is in the identical category (e.g., Singhbhum). Most of the Utkal Coastal Plain, except Balasore and the Orissa Highlands have higher share of the male migrants in comparison to their levels of economic development.

The Bihar Plain is a densely settled area (Fig. 2.14) and lacks appreciable improvement in its levels of economic development on account of the absence of industrialization (Fig. 2.13). The increase in the absolute number of people is voluminous on account of the large base resulting into strong push factor operating in these areas. It leads to higher proportion of emigration of the males giving rise to the lower share of male migrants in these areas. Saharsa and Purnea, on the other hand, are still economically attractive on account of the comparatively sparse population and late development of agriculture after the taming of the Kosi. Consequently the share of male migrants in these areas are higher in comparison to their levels of economic development.

Palamu is also a sparsely populated area and execution of the irrigational schemes have improved its agricultural prosperity attracting male migrants from the nearby rural areas. Dhanbad on account of its industrial (Fig. 2.13) and mining (Fig. 2.12) developments continues to attract male migrants.

The northern portion of the Lower Ganga Plain probably also attracts rural to rural male migrants on account of improvement in their agricultural prosperity (Fig. 2.9 and 2.10) after the Kosi was tamed. The Utkal Coastal Plain and the Orissa Highlands have larger share of male migrants on account of their development in later periods inducing all sorts of migrations—rural to rural, rural to urban and even urban to urban (Figs. 4.19 and 4.20) which is usually experienced in the take off stage of the economy.

Relationship between the Change in Levels of Economic Development and Change in Total Migration

A Scatter diagram has also been constructed to find out nature of relationship between change in the levels of economic development from 1960-61

Fig. 6.4 : Rank Order Relationship between Economic
Development and Migration

Fig. 6.3 : Rank Order Relationship between Economic
Development and Migration

to 1970-71, on the one hand, and change in the share of total migrants during 1961-71, on the other (Fig. 6.3). The scatter diagram does not show any clear cut positive correlation between the two.

The value of Spearman's rank correlation coefficient (r_s) for the two is also very small ($r_s = .15$) which is not significant even at .10 and .20 level in one and two tailed tests respectively (t=1.006).

A comparative picture of the districts in different categories of the change in the levels of economic development and change in the percentage of total migrants is given in Table 6.4.

Table 6.4 and Figs. 5.3 and 6.9 reveals that the areas of the highest change in both, in the levels of economic development and in the share of total migrants during 1961-71 are located in the Chota Nagpur Plateau, the Orissa Highlands and the Utkal Coastal Plain (Fig. 2.4). However, none of the districts are in the identical categories in both the cases. The southern portion of the Chota Nagpur Plateau and the north-western part of the Orissa Highlands have recorded higher change in the levels of economic development but show slightly lower change in the share of total migrants. Most of the Utkal Plain, except Cuttack have higher share of change in migrants as compared to change in their levels of economic development. Other parts of the Orissa Highlands, except Bolangir and Dhenkanal, and the northern portion of the Chota Nagpur Plateau also have higher change in the percentage of migrants in comparison to change in their levels of economic development.

In contrast, the whole of the Bihar Plain, excluding Saharsa and Purnea and the middle portion of the Lower Ganga Plain, which recorded lower change in the levels of development, experienced higher change in their share of migrants. Saharsa and Purnea are in the identical very low and low categories respectively. As compared to them the northern and southern sections of the Lower Ganga Plain except Midnapore, Bankura and Malda have lower change in the share of total migrants in comparison to the change in their levels of economic development.

The lower change in total migrants, in comparison to the change in the levels of economic development in the Bihar Plain and middle section of the Lower Ganga Plain is due to the large population base (Fig. 2.14) resulting in higher number of females migrating on account of social reasons. The lower change in the percentage of total migrants in economically developed but densely settled areas of the southern and northern Lower Ganga Plain may be due to two reasons : firstly, in developed and urbanized areas interaction of females on account of marriage and other associated movements are so short that they are not enumerated as migrants. Secondly, large base of the population reduces the percentage of the migrants to total population.

TABLE 6.4 : **Comparative Picture of the Districts in Different Categories of the Change in Levels of Economic Development during 1960-61 to 1970-71 and Change in the Percentage of Total Migrants, 1961-71**

Category	Change in Levels of Economic Development	Change in Percentage of Total Migration
I (Very High)	Calcutta, Dhanbad, Ranchi, Singhbum, Sundergarh and Sambalpur.	Koraput, Keonjhar, Ganjam, Puri, Mayurbhanj and Balasore.
II (High)	Cuttack, Puri, Keonjhar, Koraput and Purulia.	Sundergarh, Bolangir, Baudh Khondmals, Ranchi and Hazaribagh.
III (Med. High)	24-Parganas, Burdwan, Nadia, Hooghly, Jalpaiguri, Bolangir, Dhenkanal, Kalahandi, Balasore, Ganjam and Singhbhum.	Birbhum, Saran, Santal Parganas, Patna, Shahabad, Bhagalpur, Gaya, Champaran, Mongher, Palamu, Muzaffarpur and Sambalpur.
IV (Med. Low)	Bankura, Midnapore, Malda, Howrah, Patna, Gaya, Shahabad, Muzaffarpur, Santal Parganas, Mayurbhanj and Baudh Khondmals.	Purulia, Murshidabad, Bankura, Midnapore, Malda, Darbhanga, Singhbhum, Dhanbad, Kalahandi, Cuttack and Dhenkanal.
V (Low)	Saharsa, Champaran, Palamu Birbhum, West Dinajpur and Cooch Behar.	Burdwan, Jalpaiguri, West Dinajpur, Darjeeling, Cooch Behar and Saharsa.
VI (Very Low)	Purnea, Mongher, Darbhanga, Bhagalpur, Saran and Murshidabad.	24-Parganas, Hooghly, Howrah, Calcutta, Nadia and Purnea.

The above discussion explains why the change in total migration is not related to the change in the levels of economic development. It is, to a great extent, independent and not associated with the change in the levels of economic development.

Relationship between Change in the Levels of Economic Development and Change in Male Migration

The scatter diagram constructed to show the nature of relationship between change in the levels of economic development from 1960-61 to 1970-71 and change in the percentage of male migrants during 1961-71, shows a

better positive relationship (Fig.6.4). The value of Spearman's rank correlation coefficient is also very much greater ($r_s = .67$), which is significant even at .0005 and .001 levels in one and two-tailed tests respectively ($t = 5.987$). This means that the variation in the levels of economic development is able to explain 44.89 per cent variation in the percentage of male migrants. The limits of explained variance may lie between 40.9 and 48.9 per cent (on account of the reasons explained earlier).

The spatial pattern of the relationship between the change in the levels of economic development from 1960-61 to 1970-71 and change in the share of male migrants during 1961-71 is given in Table 6.5.

A comparative view of Figs. 5.3 and 4.10 and Table 6.5 indicates that change in the levels of economic development during 1960-61 to 1970-71 more or less correspond with that of the change in the share of male migrants. The southern portion of the Chota Nagpur Plateau and northwestern part of the Orissa Highlands form one big compact zone with the highest positive change in both the share of male migrants and the levels of economic development. The only exceptions are Singhbhum, Ranchi and Purulia. They have one of the highest change in their levels of economic development but experienced lower positive change in the share of male migrants.

The southern and central portions of the Orissa Highlands, and the southern part of the Utkal Coastal Plain recorded one of the highest (high) positive change in both, the former and the latter. There are only a few exceptions, viz., Kalahandi, Baudh Khondmals, Mayurbhanj and Ganjam recorded higher change in the share of male migrants in comparison to change in their levels of economic development. In contrast, the southern portion of the Lower Ganga Plain, particularly the Delta proper experienced lower change in the share of male migrants in comparison to improvement in their levels of economic development. Murshidabad, Birbhum and the adjoining district Santal Parganas, however, recorded much higher change in male migrants as compared to change in their levels of economic development. Darjeeling-Jalpaiguri section also experienced the comparatively lower change in male migrants. The Bihar Plain, in general, have recorded the lowest change in both the cases while some districts experienced lower change in male migrants in comparison to the change in the levels of economic development.

The cause of the lower change in percentage of migrants in the Bihar Plain and higher change in the Utkal Coastal Plain as compared to change in their levels of economic development is self-evident. They are related with the trend of change in the levels of economic development. However, the lower change in male migrants in the areas of higher change in the levels of economic development in the northern and southern Lower Ganga Plain and the southern portion of the Chota Nagpur Plateau,

TABLE 6.5 : **Comparative Picture of the Districts in Different Categories of the Change in Levels of Economic Development, 1960-61 to 1970-71 and Change in the Percentage of Male Migrants, 1961-71.**

Category	Change in levels of economic development	Change in percentage of male migrants
I (Very High)	Calcutta, Dhanbad, Ranchi, Singhbhum, Sundergarh and Sambalpur.	Murshidabad, Dhanbad, Sundergarh, Sambalpur and Cuttack.
II (High)	Cuttack, Puri, Keonjhar, Koraput and Purulia.	Puri, Keonjhar, Koraput, Ganjam, Mayurbhanj and Baudh Khondmals.
III (Medium High)	Darjeeling, Jalpaiguri, 24-Parganas, Hooghly, Burdwan, Nadia, Ganjam, Bolangir, Dhenkanal, Kalahandi, Balasore and Hazaribagh.	Calcutta, Burdwan, Birbhum, Midnapore, Purulia, Bolangir, Balasore, Dhenkanal, Ranchi, Hazaribagh and Santal Parganas.
IV (Med. Low)	Howrah, Midnapore, Malda, Bankura, Mayurbhanj, Baudh Khondmals, Patna, Gaya, Shahabad, Muzaffarpur and Santal Parganas.	Darjeeling, Jalpaiguri, 24-Parganas, Bankura, Malda, Nadia, Hooghly, Patna, Gaya, Darbhanga, Mongher and Singhbhum.
V (Low)	Birbhum, West Dinajpur, Cooch Behar, Champaran, Saharsa and Palamu.	West Dinajpur, Cooch Behar, ·Shahabad, Saran and Palamu.
VI (Very Low)	Murshidabad, Saran, Darbhanga, Mongher, Bhagalpur and Purnea.	Howrah, Champaran, Muzaffarpur, Bhagalpur, Purnea and Saharsa.

particularly in Singhbhum district needs explanation. This is mainly on account of saturation of the employment market in these traditionally economically most developed areas which has reduced the pull force of these areas leading to a lower change in the share of male migrants. The higher change in the share of male migrants in comparison to change in its levels of economic development in the northern Chota Nagpur including Palamu, Hazaribagh and Santal Parganas may be due to comparatively sparse population and some later development either in agriculture or in mining and associated industries on a meagre scale.
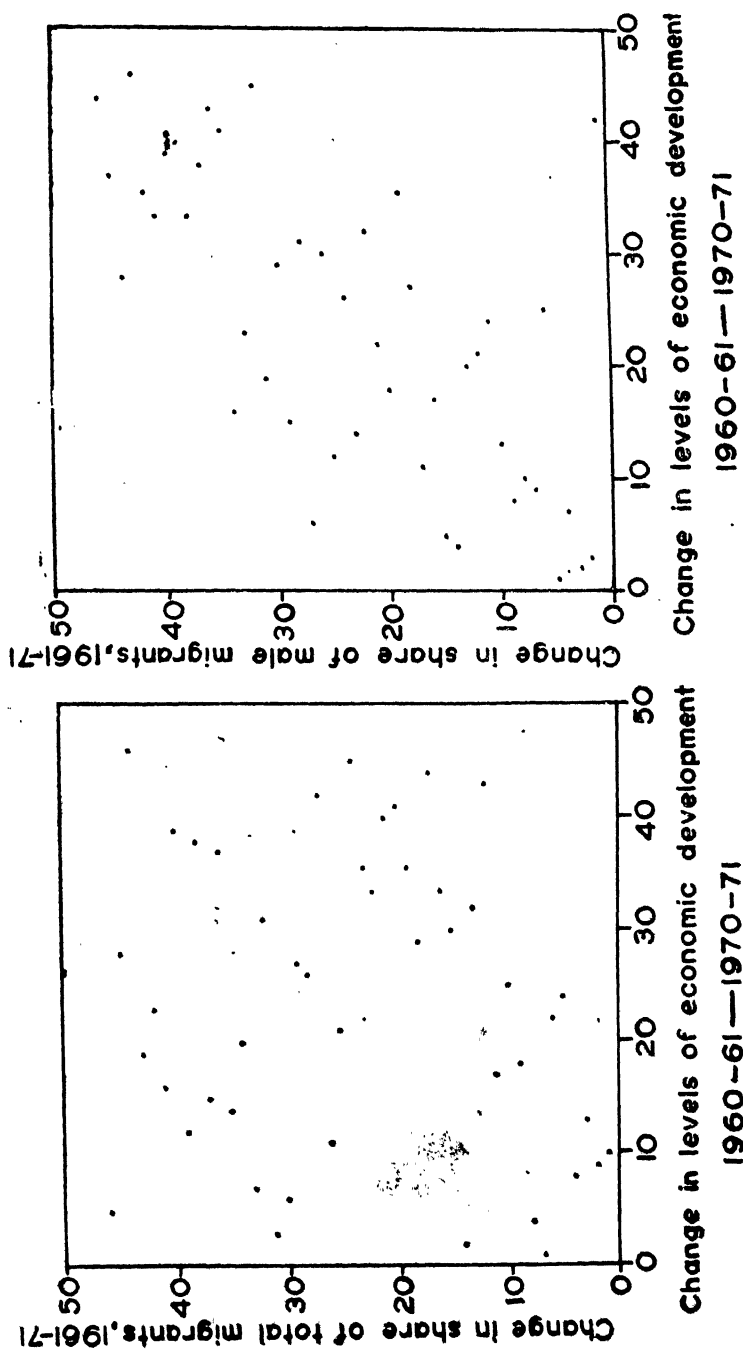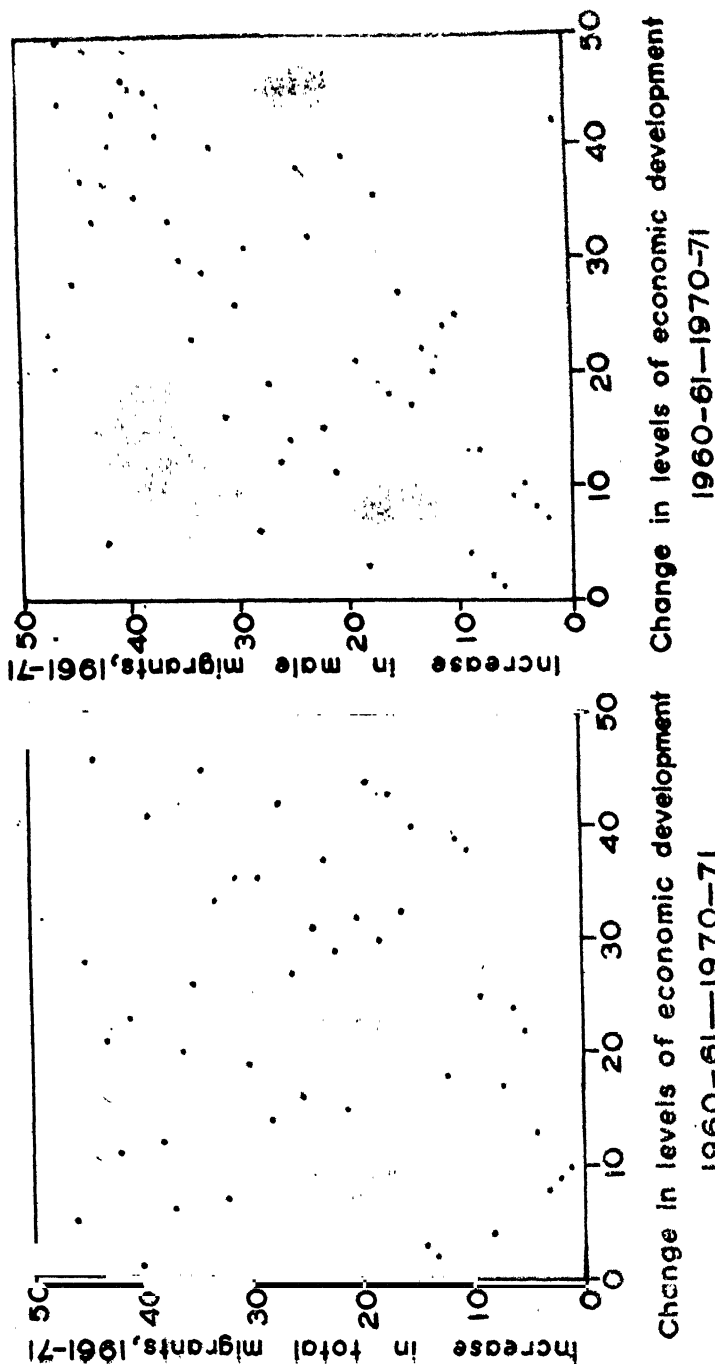
Fig. 6.6 : Rank Order Relationship between Economic
and Development Migration

Fig. 6.5 : Rank Order Relationship between Economic
Development and Migration

TABLE 6.6 : **Comparative Picture of Change in the Levels of Economic Development and Increase of Total Migrants, 1961-71**

Category	Change in levels of economic development	Increase in Total migrants
I (Very High)	Calcutta, Dhanbad, Ranchi, Singhbhum, Sundergarh and Sambalpur.	Koraput, Keonjhar, Puri, Ganjam, Balasore, Mayurbhanj.
II (High)	Cuttack, Puri, Keonjhar, Koraput and Purulia.	Hazaribagh, Ranchi, Baudh Khondmals, West Dinajpur, Cooch Behar and Bolangir.
III (Med. High)	Darjeeling, Jalpaiguri, 24-Parganas, Hooghly, Burdwan, Nadia, Ganjam, Bolangir, Dhenkanal, Kalahandi, Balasore and Hazaribagh.	Sambalpur, Dhanbad, Palamu, Shahabad, Patna, Saran, Bhagalpur, Gaya, Saharsa, Santal Parganas and Jalpaiguri.
(IV) (Med. Low)	Howrah, Midnapore, Malda, Bankura, Mayurbhanj, Baudh Khondmals, Patna, Gaya, Shahabad, Muzaffarpur and Santal Parganas.	Malda, 24-Parganas, Midnapore, Murshidabad, Burdwan, Birbhum, Nadia, Champaran, Cuttack, Muzaffarpur and Darbhanga.
V (Low)	Birbhum, West Dinajpur, Cooch Behar, Champaran, Saharsa and Palamu.	Bankura, Dhenkanal, Singhbhum, Darjeeling. Mongher, Sundergarh and Hooghly.
VI (Very Low)	Murshidabad, Saran, Darbhanga Mongher, Bhagalpur and Purnea.	Purulia, Kalahandi, Purnea, Howrah and Calcutta.

Relationship between Change in the Levels of Economic Development and Increase in the Number of Total Migrants

Since change in percentage of migrants is influenced by the size of population, the relationship has been studied with absolute numbers also. The scatter diagram for change in the levels of economic development from 1960-61 to 1970-71 and increase in the number of total migrants does not show any relationship between the two (Fig. 6.5). The value of r_s (.11) in this case is even lower than that of the change in the levels of economic development and change in the percentage of total migrants ($r_s = .15$).

The highest increase in migration has been recorded in the south-western tip and in the north-eastern portion of the Orissa Highlands and southern and northern portions of the Utkal Coastal Plain (Fig. 6.10). The only break in between the two are Dhenkanal and Baudh Khondmals in the former case and Cuttack in the latter. These areas, however, do not correspond with the highest change in the levels of economic development during the same period (Fig. 5.3) though the southern and north-central portions of the Orissa Highlands and the Central portions of the Utkal Coastal Plain have higher share of change in the levels of economic development. All the districts of the Orissa Highlands and the Utkal Coastal Plain except Bolangir and Dhenkanal in the former and Cuttack in the latter recorded lower increase in total migrants in comparison to the change in the levels of economic development.

All the districts of the north-western part of the Orissa Highlands and the southern portion of the Chota Nagpur Plateau have lower share of the increase as compared to the change in their levels of economic developments. They recorded the highest positive change in the levels of economic development. In contrast, the northern section of the Chota Nagpur Plateau, adjoining the densely settled Bihar Plain have higher share of migrants. This may be due to more interaction with the plain areas on account of social reasons (marriage and birth of child at other than the usual place of residence of their parents). The core of the Chota Nagpur Plateau and the Orissa Highlands are expected to have the least interaction on account of cultural reasons (heterogeneous racial character).

In comparison to these areas the Bihar Plain has comparatively higher share of increase in the total migrants as compared to the change in their levels of economic development. Purnea is the only exception.

The most developed parts of the north-eastern and southern portions of the Lower Ganga Plain have lower share of the increase while the least developed central part of the Lower Ganga Plain together with Cooch Behar has higher share of the increase in migrants.

In the more developed and urbanized areas the interaction with the other areas on account of marriage and associated migration is less because, people of different wards and mohallas are married together, which is not in the case of the rural areas. So higher is the rural population, the higher is the interaction on account of social reason. That is why the increase in migrants is even less related to the change in the levels of economic development than that of the change in the percentage of total migrants,

Relationship between Change in Levels of Economic Development and Increase in the Number of Male Migrants

The scatter diagram for change in the levels of economic development during the period 1960-61 to 1970-71 and increase in the number of male migrants during 1960-71 shows better positive relationship. However, the relationship is still weaker than that for the change in the share of male migrants. The value of r_s is also less (.55). However, it is significant (t=4.368) at .0005 and .001 levels in one and two tailed tests respectively. The positive variation in change in the levels of

TABLE 6.7 : **Comparative Picture of the Districts in different Categories of the Change in the Levels of Economic Development and Increase in the Number of Male Migrants**

Category	Change in the Levels of Economic Development	Increase in the number of male migrants
I (Very High)	Calcutta, Dhanbad, Ranchi, Singhbhum, Sundergarh and Sambalpur.	Murshidabad, Cuttack, Puri, Koraput Keonjhar and Sundergarh.
II (High)	Cuttack, Puri, Keonjhar, Koraput and Purulia.	Ranchi, Sambalpur, Ganjam, Baudh Khondmals and Mayurbhanj.
III (Med. High)	Darjeeling, Jalpaiguri, 24-Parganas, Hooghly, Burdwan, Nadia, Ganjam, Bolangir, Dhenkanal, Kalahandi, Balasore and Hazaribagh.	Jalpaiguri, Midnapore, Birbhum, Cooch Behar, Purulia, Hazaribagh, Dhanbad, Dhenkanal, Balasore, Bolangir, Kalahandi and Santal Parganas.
IV (Med. Low)	Howrah, Midnapore, Malda, Bankura, Mayurbhanj, Baudh Khondmal, Patna, Gaya, Shahabad, Muzaffarpur and Santal Parganas,	Burdwan, 24-Parganas, Darjeeling Hooghly, West Dinajpur, Nadia, Malda, Bankura, Singhbhum, Palamu and Gaya.
V (Low)	Birbhum, West Dinajpur, Cooch Behar, Champaran, Saharsa and Palamu.	Patna, Shahabad, Darbhanga, Mongher, Champaran and Purnea.
VI (Very Low)	Murshidabad, Saran, Darbhanga, Mongher, Bhagalpur and Purnea.	Calcutta, Howrah, Saran, Muzaffarpur, Saharsa and Bhagalpur.
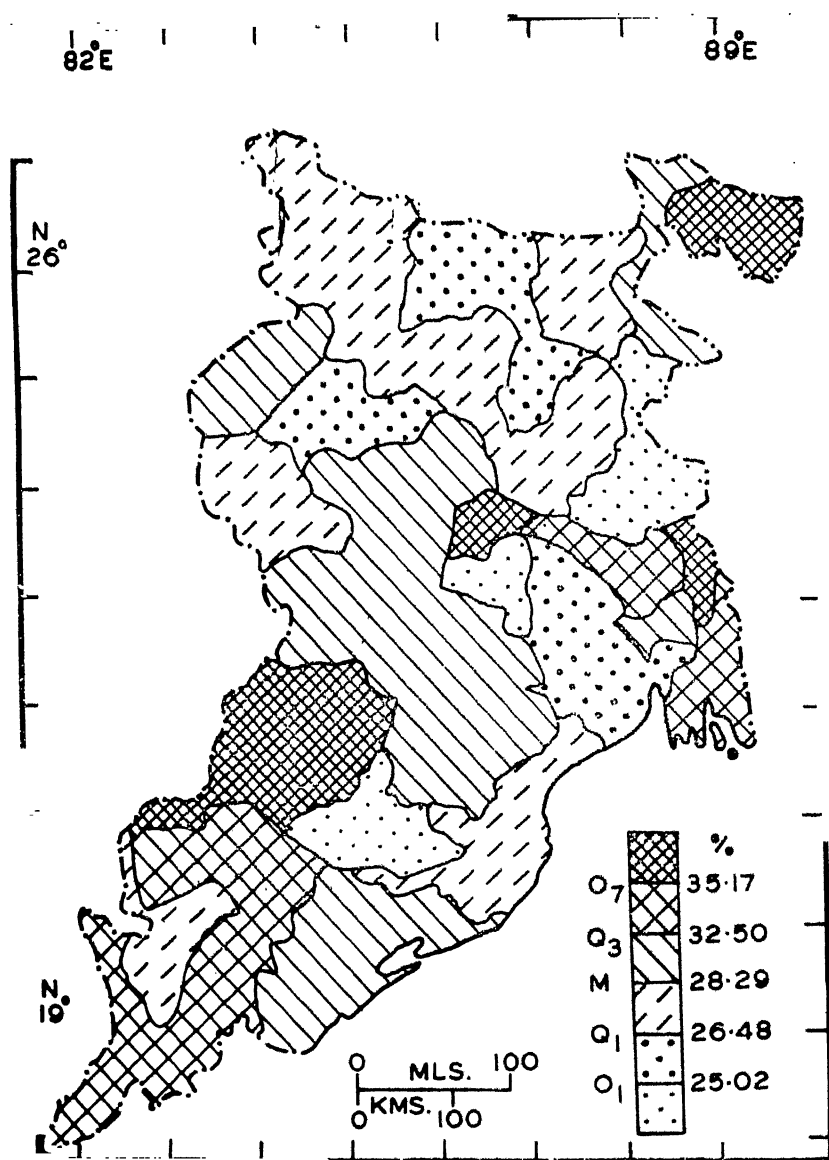
Fig. 6.7 : Bihar, Orissa & W. Bengal—Share of Total Migrants, 1971

economic development is able to explain only 30.25 per cent (or between 29.6 to 33 per cent) variation in the number of male migrants. Table 6.7 clearly brings out the spatial pattern of the relationship.

  The pattern of change in the levels of economic development (Fig. 5.4) and that of increase in male migrants (Fig. 4.11) almost correspond

with each other though most of the districts are not in the identical categories. They lie mostly in the adjoining categories. This is because of the fact that all male migrants, according to place of birth concept do not migrate only on account of economic causes, but also due to social and cultural reasons (viz., birth of child at the other place than the place of usual residence of their parents).
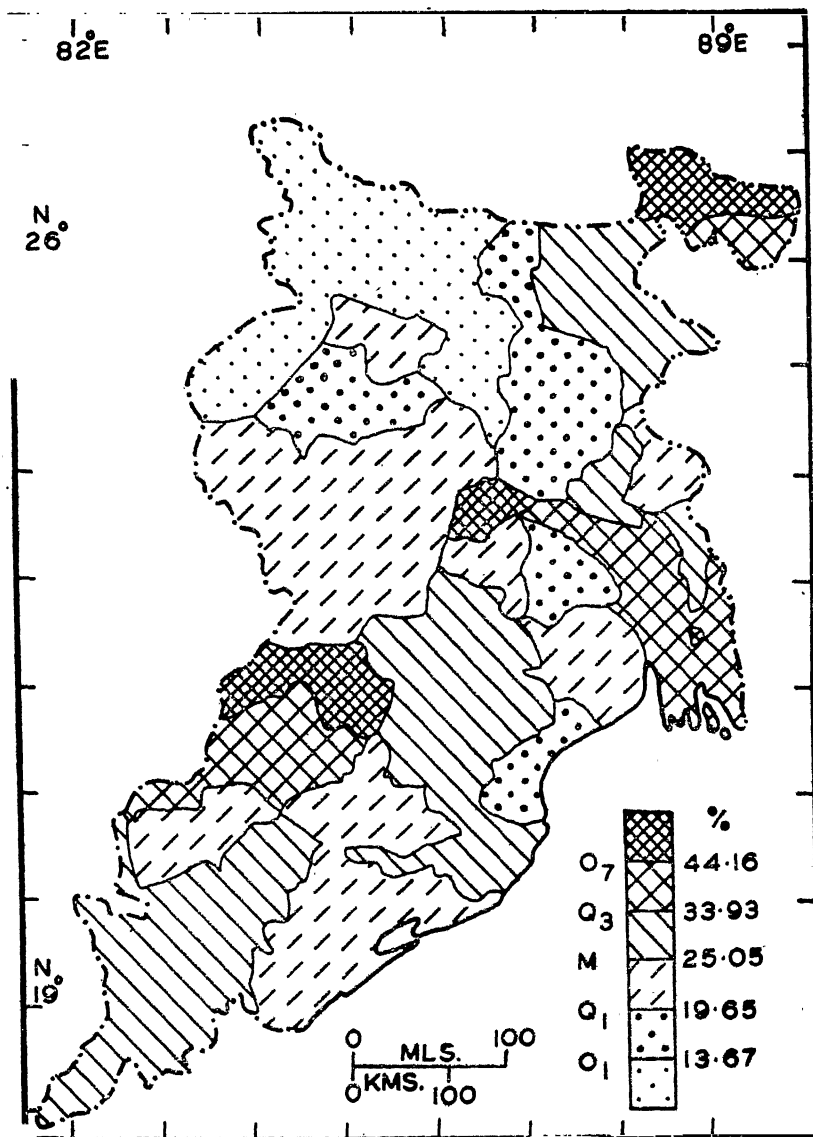
Fig. 6.8 : Bihar, Orissa & W. Bengal—Share of Male Migrants, 1971

All of the districts which fall in the very high category of the increase in male migrants (parts of the Orissa Highlands and the Utkal Coastal Plain) are either in the first or second categories of the change in the levels of economic development. Sundergarh is in the identical very high category while Koraput, Puri, Cuttack and Keonjhar have slightly higher increase in male migrants in comparison to the change in levels of
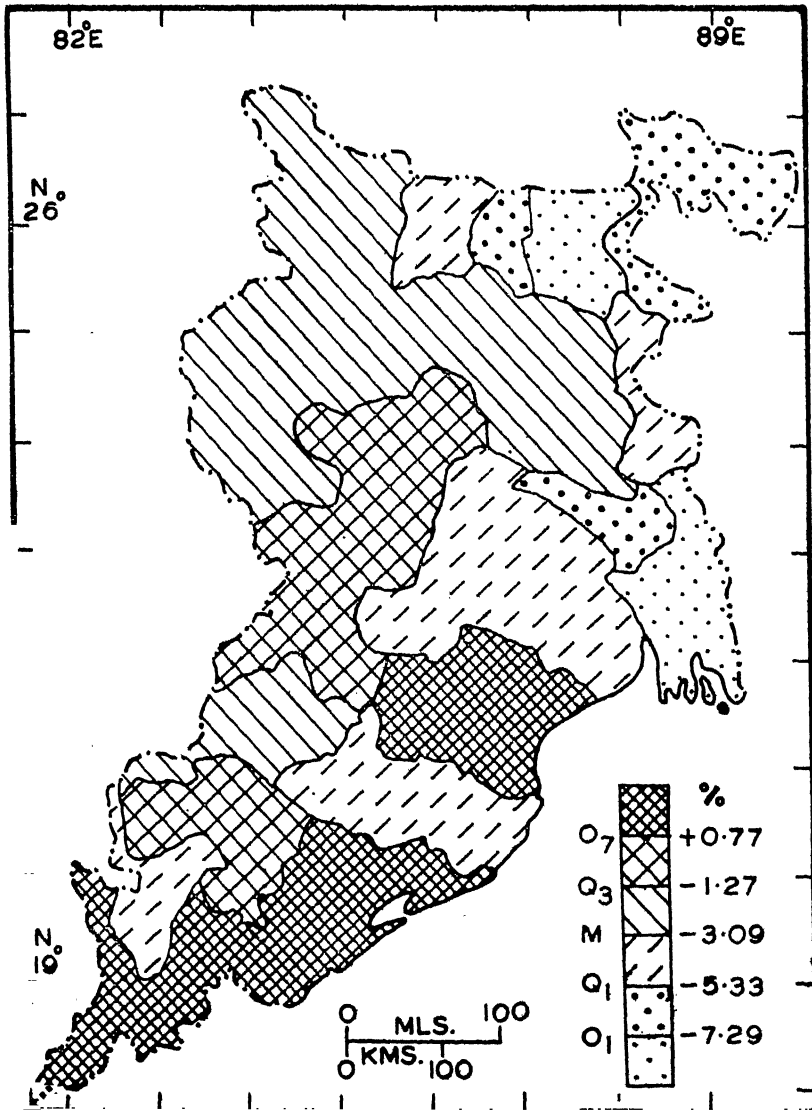
Fig. 6.9 : Bihar, Orissa & W. Bengal—Change in Share of Migrants, 1961-71

economic development. In contrast north-western portion of the Orissa Highlands except Sundergarh and the southern section of the Chota Nagpur Plateau have lower increase in male migrants in comparison to change in their levels of economic development. Singhbhum is notable with much less share of the increase. (This may be due to saturation of the employment market and higher natural increase).
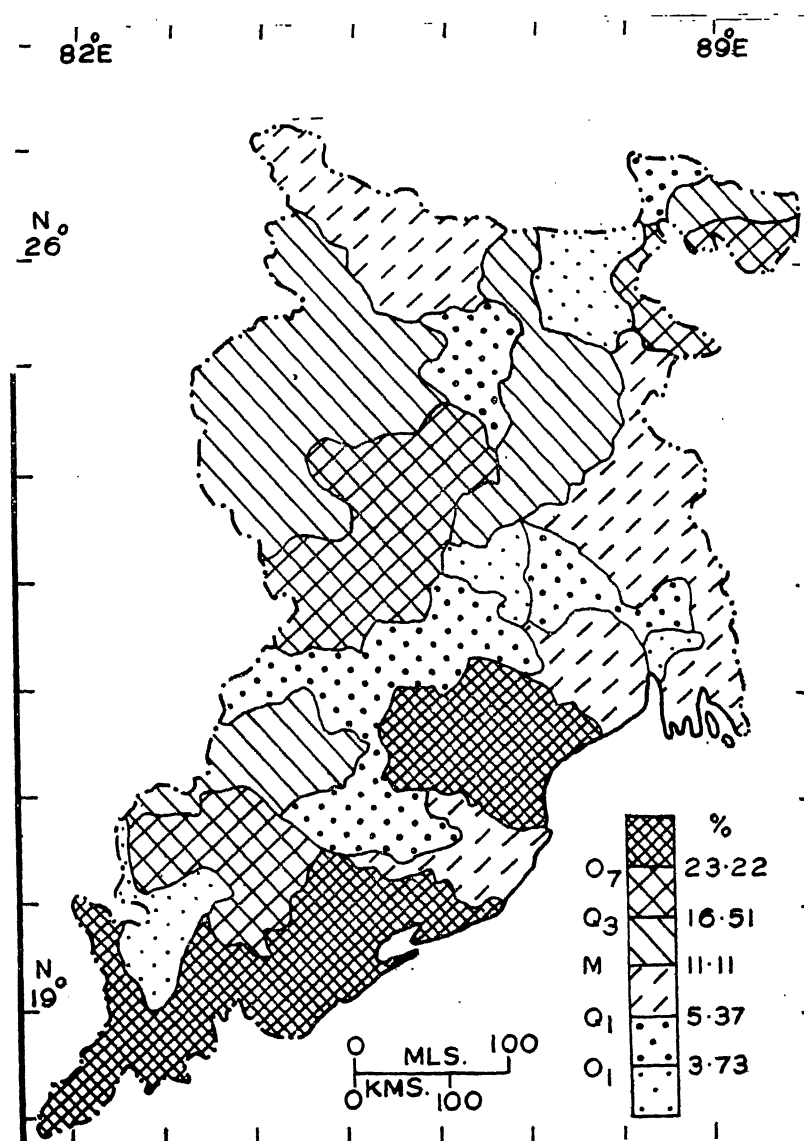
Fig. 6.10 : Bihar, Orissa & W. Bengal—Increase in Total Migrants, 1961-71

The northern portion of the Chota Nagpur Plateau either have the same proportion of increase in male migrants or higher. The fact mentioned earlier explains the phenomena.

The Bihar Plain in general experienced low change in the levels of economic development as well as in increase in the male migrants. Even some of them have lower increase in male migrants in comparison to the change in their levels of economic development.

The southern and north-eastern portions of the Lower Ganga Plain have much lower share of the increase in male migrants in comparison to the change in their levels of development. Again the central Lower Ganga Plain including Cooch Behar has higher share of the increase in male migrants. They seem to have been attracted male migrants from the rural areas on account of their agricultural development and consequent urbanization after the taming of the Kosi and other rivers.

From the above discussions it may be concluded that total migration has almost no relation with the levels of economic development. Male migration is, however, positively related with the levels of economic development. The variation in the levels of economic development is able to explain 38.5 to 46.7 per cent variation in the share of male migrants. Even temporal change in the levels of economic development explains between 40.9 and 48.9 per cent temporal variation in the percentage of male migrants in Eastern India, during 1961-71. But the temporal variation in the levels of economic development is able to explain only between 29.6 and 33 per cent temporal variation in the number of male migrants.

However, the explained variance even in the case of the male migration is less than half (fifty per cent). The other unexplained (50%) variation may be due to the defect of the migration data based upon place of birth concept in which the male children, born at a place other than the usual place of residence of their parents (which may happen mainly due to social or cultural causes), are termed as migrants. In other words, about one-half of the total male migration is on account of social reasons.

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7

Summary and Conclusion

General Summary

BESIDES fertility and mortality population mobility is the only source of population change and thereby it is very important owing to its impact on demographic, economic, social and political situation of a region. In short run, it is influenced by the levels of economic development but in the long-run it influences economic development.

In the present study an attempt has been made to find out the relationship between the levels of economic development and migration pattern. Lee's theory of Migration that 'majority of migration is short-distance', and 'the hypothesis of transition mobility', propounded by W. Zelinsky have also been tested.

Eastern India, consisting of the States of Bihar, Orissa and West Bengal has been selected as the study area because it consists of one of the most underdeveloped and over-crowded agricultural tracts on the one hand and the most urbanised and industrialized zones with ample employment opportunities on the other.

The study is based on secondary sources of data, available with the Census of India, the Director of statistics of the respective States and Collectors of the districts in published or unpublished form. Administrative district has been taken as the smallest unit of study.

The study is limited to the period 1961-71.

Migration pattern for both total and male migrants have been studied together with temporal change therein during 1961-71. Migrants have also been classified by distance and direction.

The levels of economic development have been studied with the help of a number of indicator representing different aspects of development. Composite ranks of the indices have been used for categorising the districts into different levels of the development. Finally the migration pattern has been correlated to the levels of development with the help of scatter diagrams and Spearman's rank coefficient of correlation.

The study reveals that about two-thirds of the total population are immobile. The share of mobile population varies, however, from 21.74% in Murshidabad to 44.26% in Dhanbad.

Industrial areas and the areas of commercial agriculture, viz., Darjeeling and Cooch Behar, etc., are the areas of higher immigration. In contrast, the plain areas of Bihar and the plateau areas of Bihar, Orissa and West Bengal which are devoid of industrial development, are areas of low migration.

On an average the share of migrants to total population has gone down by 3.50% during 1961-71. However, the change varies from +4.46% in Koraput to −19.21% in Calcutta. This indicates that the immobile population has increased at a higher rate than the mobile population. It goes against the hypothesis of transition mobility. However, the absolute number of migrants has gone up, thereby it still supports the hypothesis of transition mobility but with less force. In Bihar and West Bengal all the districts have recorded a decline in the share of mobile population, while 50% of the districts of Orissa have recorded a positive change in the percentage of mobile population. The different pattern in Orissa is on account of its economic development in later years together with its sparse population, generating higher proportion of migrants.

There seems to be an inverse relation between the share of migrants to total population in 1971 and temporal change in the percentage of mobile population during 1961-71. The areas of higher percentage of mobile population have recorded a higher decline in figures and vice-versa, of course, with a few exceptions, e.g., Purnea and Saharsa. They are comparable to the conditions in Orissa. They have comparatively sparse population and have undergone agricultural development in later years after the Kosi was tamed.

The number of migrants increased on an average by 11.83% during 1961-71. It varied from a decline of 31.67% in Calcutta to an increase of 57.45% in Koraput district. The inverse relation between the percentage of mobile population in 1971 and increase in the number of migrants during 1961-71 stands, but with less force. This is because an increase in the total population leads to corresponding increase in the mobiles particularly females, who migrate on account of the social reasons. The large absolute increase is not expressed in the percentage figures on account of large population base resulting into lower per cent change.

Male migrants account for only 28.34% of the total migrants and the rest (71.66%) is made up by females. The areas of higher percentage of male migrants are those which are industrially developed, having sparse population or have commercial agriculture, attracting migrants on account of economic causes. The plain areas of Bihar with one of the densest population have the lowest share of male migrants, because they are economically unattractive consequently most of the migration is on account of social causes involving mainly females.

Total migrants are more uniformly distributed than the male migrants. The value of octiles one and seven of the location coefficients

are 86 and 1.18 respectively for the former while they are 0.47 and 2.50 respectively for the latter. The main cause behind this pattern is that the total migrants include female migrants, which constitute the largest share of the total migrants. And since female migration is usually associated with marriages, total migration is expected to be in proportion to the share of the total population. Location quotients for total and male migrants testifies this hypothesis. For total migrants they are very close to one and vary only between 0.71 and 1.61, while for the male migrants they vary greatly (between 0.27 to 2.88). This means that male migrants do not show a close relationship with the magnitude of population. Obviously it is more a result of disparity in levels of economic development and employment opportunities.

On an average the share of male migrants has slightly increased (0.59%) during the last decade (1961-71). Most of the districts of Bihar except Hazaribagh, Ranchi and Dhanbad and all the districts of West Bengal except Murshidabad, Calcutta, Birbhum, Midnapore and Purulia have recorded a decline in the percentage of male migrants. In contrast, all the districts of Orissa have experienced an increase in the share of male migrants. Similarly all the plateau districts of Bihar have experienced an increase in the number of male migrants while all the plain districts have recorded decrease in it.

On an average intra-district migrants constitute the largest share (67.83%) of the total migrants. Inter-district and inter-State migrants account for 14.25 and 9.70 per cent respectively. This substantiates the hypothesis of Lee that short distance migrants constitute the major component in migration.

The spatial pattern of short, medium and long distance migration reveals that except economically attractive areas all the areas have predominantly short-distance migrants, which is mainly the result of social causes, viz., marriage migration, and the return of the females to mother's house for giving birth to children, etc. In contrast, economic migrations are comparatively long-distance.

Broadly speaking the share of intra-district and inter-State migrants have decreased by −1.01 and −0.03 per cent respectively while inter-district migrants have recorded a slight increase (+1.36%) during 1961-71. This suggests that short and long distance migrations have registered a decline but medium-distance migration has increased. This temporal pattern may be due to increase in the number of unemployed youths on the one hand and saturation of employment marked in the industrially most developed and urbanized areas on the other. Consequently they move to the nearby towns or rurban centres in search of employment mainly in the banking and educational services.

In Bihar all the districts except Saharsa and Purnea have experienced a decline in the share of short distance migrants. In Orissa also, all the

districts, except Cuttack, Bolangir and Kalahandi have recorded a decline in the share of short distance migration. In contrast, all the districts of West Bengal except Darjeeling, Murshidabad, 24-Parganas, Burdwan and Midnapore, have experienced an increase in the share of short distance migrants. It seems that except in the districts which are economically attractive, in others the share of long-distance migration has decreased resulting in an increase in the share of medium or short-distance migration.

The medium distance migration has increased in all the districts of the area under study except in Saharsa of Bihar, Howrah and Calcutta of West Bengal and Cuttack, Bolangir, Kalahandi and Koraput of Orissa. The probable cause has been mentioned earlier.   -

The long distance migration has decreased all over Bihar and West Bengal except in Saran, Muzaffarpur, Purnea, Santal Parganas, Palamu, Ranchi and Dhanbad in the former and Darjeeling, Cooch Behar, Birbhum, Midnapore and Purulia in the latter. Surprisingly, the majority of the district of Orissa have experienced an increase in the share of long-distance migration. Only Mayurbhanj, Dhenkanal, Baudh Khondmals and Kalahandi are exceptions. The increase in inter-State migrants in the border districts does not indicate the increase in long-distance migration, because even short-distance migration involving females are enumerated as inter-State migrants on account of crossing of the State borders. Such movements increase with growth in the total population. So far as Orissa is concerned the north-western portion of the Orissa Highlands and central part of the Utkal Coastal Plain attract long distance migrants on account of their later developments in industries and mining. Moreover, such areas which have efficient transportation system connecting it with Calcutta facilitate inter-State movements.

The share of male migrants in the short-distance migration is only about one-fourth. It increases with distance to one-third and one-half respectively in medium and long-distance migration. This clearly reveals that marriage migration is usually short distance and economic migration covers longer distances. This fact is also well exemplified by the spatial pattern of the percentage of male migrants in short, medium and long-distance migration.

On an average, the share of males in short distance migration has slightly increased (+0.75%) while in medium and long distance migrations it has slightly decreased (−0.99 and −2.71 per cent respectively). In Bihar, the share of male migrants has declined in all the categories (short, medium and long-distance) of migration. There are only a few exceptions, which are not identical in both the categories. In West Bengal too, the position is the same. In contrast, all the districts of Orissa have experienced a positive change in all types of migrations—short, medium and long-distance. Of course there are some exceptions. Its probable causes have been indicated earlier.

On an average, rural to rural migrants account for the largest share (81.53%) of the total migrants. Rural to urban, urban to urban and urban to rural migration account for 10.16, 4.77 and 3.03 per cent respectively. The share of rural to rural migrants has gone down (—1.98%) but it has increased in the case of rural to urban, urban to urban and urban to rural migrants, gradually rising towards the latter (+0.19, +0.44 and +1.25 per cent respectively) during 1961-71.

As compared to the total migrants, male migrants account for 66.09, 19.10, 7.62 and 4.22 per cent respectively of rural to rural, rural to urban, urban to urban and urban to rural migrations. Since rural to urban and urban to urban migration are more important from economic point of view the shares of male migrants are higher, because they generally migrate on account of economic causes. However, the percentage of male migrants registered a positive change in the case of rural to rural and urban to urban migrations (+0.55 and +0.11 per cent respectively) while it has declined in the case of rural to urban and urban to rural migrations (—3.41 and —4.41 per cent respectively).

The share of male migrants in rural to rural migration are 77.40, 15.32 and 7.64 per cent respectively in short, medium and long-distance migrations. The same trend is also found in the cases of rural to urban and urban to rural migration, but with less force. The percentage of male migrants in short, medium and long distance migrations are 47.80, 29.05 and 16.55 respectively in the former case and 43.17, 30.65 and 21.23 respectively in the latter. In the case of urban to urban migration the percentage of male migrants is the maximum in medium distance migration followed respectively by long and short-distance movements. The above observations also substantiate the fact that male migrants move mainly on account of economic reasons. The rural to rural movement of male migrants is associated with the social customs (birth of child at the other place). That is why its share in the short distance migration is more than three-fourths (77.40%).

So far as the trend of change in the share of male migrants in rural to rural migration is concerned, it has increased slightly in short-distance migration but decreased steadily in the case of medium and long-distance migration, more so in the case of the latter. The rate of change is +0.89, —0.03 and —0.62 per cent respectively for short, medium and long-distance migrations. For rural to urban migration, the change is positive in the case of short and medium-distance migration (+1.41 and +1.40 per cent respectively), but negative in the case of long-distance migration (—1.80). So far as urban to urban migration is concerned, it has recorded a negative change for short and long distance migration (—8.25 and —1.14 per cent respectively), more so in the case of short distance migration. The urban to rural migration has recorded a negative change in short and

medium distance migration (—0.87 and —0.08 per cent respectively), but the change is positive for long-distance migration (+0.88).

The pattern of change of male migrants in rural to rural, rural to urban, urban to urban and urban to rural in short, medium and long-distance migration indicates a reduction in the "pull" of the big urban, industrial and commercial centres. Rather "push back" factor seems to be operating in them, which is obvious from the positive change in long distance male migration from urban to rural areas. The increase in the short distance migration of males in rural to rural migration may be on account of social reasons.

The economically most developed areas occur in the southern portion of the Lower Ganga Plains (the Delta proper) including Catcutta, Howrah, Hooghly, 24-Parganas and Burdwan districts, the south-eastern part of the Chota Nagpur Plateau (Dhanbad-Singhbhum), the north-western section of the Orissa Highlands (Sundergarh-Sambalpur) ; and in the north-eastern portion of the Lower Ganga Plains (Darjeeling-Jalpaiguri). The plain areas and other parts of the plateau regions are in the lower levels of economic development, the Bihar Plain in the lowest level.

Thus the economically most developed areas in 1970-71 are around the hub of the commercial activities (Calcutta) and industrial, mining and/ or plantation areas. The least developed areas are predominantly agricultural plain and plateau areas, which lack mining and industrial facilities.

The highest improvement in the levels of economic development during 1961-71 has been recorded in the industrialized and mineralized belt of the plateau region (the Chota Nagpur Plateau and the Orissa Highlands). The second category of increment in the levels of economic development has been recorded in the southern portions of the Utkal Coastal Plain and the Orissa Highlands and in such portions of the Lower Ganga Plain which is attached with the Chota Nagpur Plateau (Burdwan). Major portions of the Bihar Plain and the Lower Ganga Plain have recorded lower to the lowest improvement in their levels of economic development. Surprisingly enough the areas adjacent to Calcutta have experienced the lowest positive change in the levels of economic development.

Thus the temporal change from 1960-61 to 1970-71 in the levels of economic development has been higher either in already developed district or in the newly industrializing areas while the areas of the least improvement in the levels of economic development continue to be in those areas which were already low on the ladder of economic development. Such areas are agricultural plain regions or the plateau areas which are devoid of mineral wealth and consequently lacking in the development of mining and industrial activities.

Spearman's Rank Correlation Coefficient has been calculated for a number of variables. The level of economic development in 1970-71 has a

weak positive correlation ($r_s = .46$) with the percentage of migrants in total population in 1971, which is significant (the value of $t = 3.436$) at .005 and .01 levels. The spatial variation in the levels of economic development is able to explain only between 19.3 to 23.1 per cent variation in the share of total migrants. Such pattern of relationship between the levels of economic development and the share of total migrants is on account of larger proportion of females in total migrants, who mainly migrate on account of social and cultural reasons and not due to economic causes.

The levels of economic development in 1971, however, show a stronger positive correlation ($r_s = .65$) with the percentage of male migrants in 1971. The correlation is very significant ($t = 5.67366$) even at .0005 and .001 levels. The spatial variation in the levels of economic development is able to explain between 38.5 and 46.7 per cent variation in the percentage of male migrants. The high correlation between the levels of economic development and male migrants substantiates the fact that male migration is usually associated with economic conditions.

The correlation between the temporal change in levels of economic development from 1960-61 and to 1970-71 and temporal change in the percentage of total migrants during 1961-71 is weaker ($r_s = .15$). The correlation between the temporal change in levels of economic development and increase in the number of total migrants is even more weak ($r_s = 0.11$). On the other hand, the correlation between the temporal change in levels of economic development and temporal change in the percentage of male migrants ($r_s = .67$) is very strongly positive, and is very significant ($= 5.987$) even at .0005 and .001 levels. The variation in the temporal change in levels of economic development during 1960-61 and 1970-71 is thus able to explain between 40.9 and 48.9 per cent variation in the temporal change of male migrants during 1961-1971.

The coefficient of Spearman's rank correlation is less ($r_s = .55$) for the temporal change in levels of economic development from 1960-61 to 1970-71 and the increase in the number of male migrants during the same period. However, it is still significant ($t = 4.368$) even at .0005 and .001 levels. The positive variation in the temporal change in levels of economic development is thus able to explain between 29.6 and 33 per cent variation in temporal increase in the number of male migrants.

The weaker relationship between change in the levels of economic development and change in the share of total migrants, on the one hand, and the change in the levels of economic development and increase in the total migrants are on account of the following facts.

The rapid population growth in the densely settled areas such as the Bihar Plains, adds considerably to the number of female migrants on account of the large population base. And since female migration is usually not associated with the economic conditions the change in the

total migrants is not related with change in the levels of economically developed.

In contrast, in the traditionally developed and urbanized areas the movements on account of social reasons are so short that they are not enumerated as migrants. The large population base also reduces the percentage figures. Moreover, the saturation of the employment market in these developed areas has started working as push back factor for the male migrants.

Contrary to them, the districts of Orissa has started attracting migrants on account of the newer developments. Together with it the small population base increase the percentage figures.

Conclusion

Thus, it can be concluded that Lee's theory of migration under test and the hypothesis of transition mobility have been justified by the study of migration pattern in Eastern India during 1961-71.

The study also shows that the spatial pattern of male migrants, but not the total migrants, is closely related with the levels of economic development in Eastern India during 1961-71. However, variation in the levels of economic development is able to explain only between 38.5 and 46.7 per cent variation in the percentage of male migrants in 1971. The variation in the temporal change of levels of economic development during 1961-71, however, is able to explain between 40.9 and 48.9 per cent temporal change in the percentage of male migrants during the same period.

The study further reveals that the variation or change in the levels of economic development is able to explain less than 50 per cent variation or change in the share of male migrants and cannot explain female migration or total migration at all.

One cause may be deficiency of the data. However, the real cause of the unexplained variance can only be ascertained by further studies based on the data generated with the help of purposive sampling. This is a task beyond the capability of a single research worker.

Total Migrants (in percentage)

| Districts | Share of Migrants to total population | Distance Covered | | | Direction of Movements | | | |
		Intra-district	Inter-district	Inter-State	Rural to Rural	Rural to Urban	Urban to Urban	Urban to Rural
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Patna	28.00	69.94	26.36	2.98	69.51	17.01	8.15	4.78
Gaya	25.60	83.34	15.60	1.05	86.65	6.58	2.28	4.39
Shahabad	29.04	82.04	10.05	7.66	86.11	7.62	2.28	3.88
Saran	28.22	88.60	5.39	5.91	93.79	3.15	0.84	2.19
Champaran	28.00	83.62	8.14	4.98	90.96	4.83	1.57	2.45
Muzaffarpur	26.82	81.24	15.27	0.62	90.94	5.27	1.39	1.97
Darbhanga	25.42	84.06	13.19	0.55	93.51	3.80	1.19	1.40
Mongher	26.74	75.31	22.78	1.65	83.00	9.39	3.88	3.34
Bhagalpur	26.48	69.90	27.91	1.77	86.04	7.33	2.99	3.43
Saharsa	25.79	74.04	23.58	1.66	81.88	5.73	1.25	1.08
Purnea	27.01	66.40	22.75	7.37	89.19	6.50	2.29	1.94
Santal Parganas	27.17	80.18	12.33	7.24	90.55	5.16	2.54	1.81
Palamu	28.26	82.28	13.56	3.98	91.11	4.16	1.83	2.80
Hazaribagh	30.01	73.53	18.76	5.99	78.79	13.33	4.83	2.90
Ranchi	28.89	75.27	14.06	9.62	76.66	12.33	6.89	4.07
Dhanbad	44.26	31.38	40.00	26.32	40.36	43.69	12.42	2.90
Singhbhum	30.50	56.65	15.37	25.19	59.92	26.68	11.28	1.38
Darjeeling	31.84	27.67	7.72	29.85	62.12	12.29	12.07	4.40
Jalpaiguri	40.32	28.52	7.13	24.34	88.68	4.71	2.58	2.56

Appendices

Distance Covered and Direction of Movement, 1971

Male Migrants (in percentage)							
Distance Covered				Direction of Movement			
Share of Male Migrants in total migrants	Intra-Distt.	Inter-Distt.	Inter-State	Rural to Rural	Rural to Urban	Urban to Urban	Urban to Rural
(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
23.66	17.21	29.81	49.03	38.97	24.88	15.96	1.41
14.05	12.41	20.22	58.33	68.13	19.38	6.25	6.88
13.12	11.29	23.52	19.14	65.33	22.67	6.67	4.67
6.90	5.94	16.29	12.65	74.70	15.66	3.61	6.02
13.67	11.79	25.13	29.12	75.38	15.38	3.85	5.38
9.45	8.09	14.75	46.12	64.71	24.37	5.88	4.20
9.96	8.81	15.62	50.61	73.85	17.69	4.62	3.08
12.38	10.98	15.25	38.89	61.24	24.03	10.85	3.10
13.99	10.50	17.12	36.88	63.64	23.38	7.79	3.90
19.65	16.93	27.13	57.75	81.20	13.68	3.42	1.71
28.60	20.86	46.81	42.22	79.59	13.27	4.08	2.72
17.51	15.13	26.53	28.17	76.00	14.67	6.00	2.67
19.83	17.77	29.76	28.56	82.14	9.52	3.57	5.95
23.74	13.28	41.88	45.80	50.26	33.85	10.77	4.62
23.12	15.75	36.96	40.84	49.42	29.07	15.12	5.23
47.07	22.53	61.58	54.32	24.41	58.19	14.38	2.01
29.58	18.74	56.22	43.03	28.57	49.55	18.75	2.23
54.75	46.76	50.88	63.17	59.55	14.61	12.36	4.49
51.71	45.64	47.60	60.04	88.13	5.48	2.28	2.74

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Cooch Behar	35.17	30.70	3.19	7.90	90.07	3.48	3.56	1.63
West Dinajpur	31.16	44.81	7.88	12.27	91.50	3.82	2.71	1.00
Malda	24.43	66.79	6.06	8.52	83.37	2.62	1.83	1.40
Murshidabad	21.74	72.03	11.83	3.43	87.81	6.60	3.17	2.43
Nadia	38.35	23.67	9.98	3.31	84.95	8.20	9.54	5.81
24-Parganas	33.13	42.03	13.75	11.35	61.80	14.86	15.06	2.07
Howrah	26.08	49.78	16.66	23.44	52.68	21.11	10.70	3.09
Calcutta	33.45	—	20.63	50.71	—	64.52	22.13	—
Hooghly	31.32	43.67	24.74	16.30	64.27	14.41	12.32	4.47
Burdwan	33.00	42.12	21.34	23.39	68.66	14.58	8.84	4.58
Birbhum	24.71	67.94	16.26	10.24	87.21	6.43	2.96	3.14
Bankura	25.02	80.44	14.24	21.01	89.33	8.83	2.09	4.22
Midnapore	26.31	83.61	6.89	6.39	88.07	4.39	3.03	2.79
Purulia	24.87	74.75	9.95	13.12	85.92	6.87	4.40	2.41
Sambalpur	36.48	71.54	17.50	10.19	80.62	12.83	3.82	2.20
Sundargarh	39.03	51.04	22.20	25.46	58.25	31.07	9.31	3.62
Keonjhar	32.11	69.86	18.83	11.00	85.19	9.36	1.64	3.76
Mayurbhanj	29.44	81.93	9.09	8.28	93.79	4.01	0.72	1.33
Balasore	26.32	78.46	12.10	9.40	84.44	5.68	1.30	1.53
Cuttack	26.72	85.63	9.77	4.09	84.81	9.40	1.42	2.84
Dhenkanal	24.72	85.41	13.46	1.07	84.43	4.97	1.21	9.36
Baudh Khondmals	32.66	80.21	18.64	0.60	92.60	4.00	1.28	2.02
Bolangir	32.50	85.55	12.21	2.16	88.98	7.45	2.40	1.03
Kalahandi	26.59	84.69	11.30	3.83	83.57	6.15	2.05	6.74
Koraput	33.30	71.50	8.99	11.12	83.77	8.46	4.14	3.47
Ganjam	30.28	89.67	3.66	5.40	82.92	9.72	3.63	3.53
Puri	32.26	80.78	15.10	3.40	81.76	11.87	4.51	1.74
Eastern India average	29.83	67.83	14.24	9.70	81.53	10.16	4.77	3.03

(10)	(1 1)	(12)	(13)	(14)	(15)	(16)	(17)
38.92	32.83	48.42	58.79	85.19	6.17	4.94	2.47
33.38	26.15	42.74	53.77	87.30	5.56	3.97	1.59
25.26	21.36	40.47	44.92	88.89	6.17	2.47	2.47
23.54	21.73	27.98	46.27	79.39	9.92	5.34	3.82
31.63	25.02	35.80	64.48	57.00	10.00	12.00	8.00
36.53	21.42	50.19	72.83	41.63	13.97	17.76	2.04
37.09	17.27	39.20	85.96	26.42	34.91	14.62	3.30
76.29	—	65.47	80.70	—	67.36	19.55	—
35.40	19.98	37.41	73.71	46.30	23.70	15.93	5.56
44.16	31.62	43.49	67.37	60.48	18.95	10.69	5.44
26.28	22.73	31.09	42.02	77.98	11.01	4.59	4.59
18.66	18.27	25.35	55.20	80.81	6.06	3.03	8.08
23.56	21.13	30.66	47.73	77.64	10.27	6.34	4.53
23.45	20.26	32.26	35.16	73.91	11.96	7.61	4.35
37.51	34.64	42.47	47.75	73.71	17.93	5.18	2.79
45.64	35.75	54.78	57.53	48.62	35.91	11.60	3.87
31.89	31.13	13.59	37.22	73.47	15.31	3.06	8.16
25.08	24.04	29.22	30.73	86.79	8.49˙	0.94	1.89
18.82	15.23	31.39	33.07	80.41	14.43	3.09	2.06
26.83	23.71	41.31	57.46	71.43	20.15	5.13	2.93
24.39	21.51	40.26	54.81	74.36	10.26	2.56	12.82
30.84	27.72	43.63	49.79	88.71	6.45	1.61	3.23
23.17	21.56	28.48	56.67	77.89	14.74	5.26	2.11
26.53	22.58	49.02	47.51	73.17	10.98	3.66	12.20
33.93	29.62	54.31	45.11	75.94	12.26	6.13	5.19
25.01	23.71	43.88	33.67	72.09	16.28	6.40	4.65
22.07	16.86	42.63	54.31	55.42	30.12	10.84	3.01
28.34	20.84	36.66	48.68	66.09	19.10	7.62	4.22

APPENDIX—B : **Change in Total and Male Migrants Classified by**

Total Migrants (Percentage change)								
Districts	Share of migrants to total population	Distance Covered			Direction of movements			
		Intra-district	Inter-Distt.	Inter-State	Rural to Rural	Rural to Urban	Urban to Urban	Urban to Rural
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Patna	—1.91	—0.65	+1.10	—0.48	—3.00	—0.90	+0.71	+2.78
Gaya	—2.50	—0.35	+1.15	—0.14	—3.96	—3.64	+0.65	+2.89
Sahabad	—1.93	—0.32	+0.98	—0.47	—2.75	+0.23	+0.45	+2.12
Saran	—1.27	—0.32	+0.63	+0.02	—0.63	—0.53	—0.08	+1.40
Champaran	—2.56	—0.82	—0.12	—0.34	—2.00	—0.24	+0.35	+1.91
Muzaffar-pur	—3.01	—1.85	+1.80	+0.01	—1.25	—0.14	—0.10	+1.21
Darbhanga	—3.18	—0.53	+0.58	—0.05	—0.60	—0.61	+0.22	+0.98
Mongher	—2.69	—3.18	+3.54	—	—2.49	—0.76	+0.71	+2.17
Bhagalpur	—2.20	—3.31	+4.11	—0.26	+11.67	—0.37	+0.54	+2.53
Saharsa	—5.81	+2.86	—2.27	—0.33	—11.12	+0.56	+0.58	+0.18
Purnea	—8.56	+3.25	+0.50	+0.35	—1.52	—0.23	+0.73	+0.99
Santal Parganas	—1.69	—0.40	+0.83	+0.34	—1.38	—0.10	+0.53	+0.90
Palamu	—2.05	—1.94	+1.89	+0.02	—0.54	—1.18	+0.61	+1.36
Hazaribagh	—0.99	—2.83	+3.12	—0.89	—7.32	+3.98	+2.21	+1.10
Ranchi	—0.39	—4.21	+4.61	+0.78	—7.51	+3.40	+2.31	+2.10
Dhanbad	—4.37	—4.41	+2.25	+2.41	—7.51	+24.31	+7.30	+1.00
Singhbhum	—4.13	—2.60	+4.48	—1.02	—4.80	+1.88	+2.41	—0.05
Darjeeling	—6.26	—1.23	+2.05	+1.66	—2.78	—7.40	—1.62	—0.02
Jalpaiguri	—5.87	+0.85	+1.78	—0.96	—0.69	—1.41	+0.75	—0.09
Cooch-Behar	—6.61	+0.62	+0.50	+1.01	+2.83	—3.31	—0.80	+0.16
West Dinajpur	—6.03	+0.40	+0.67	—0.17	—0.24	—0.96	+1.10	+0.24

Distance Covered and Direction of Movements, 1961-71

Male Migrants (percentage change)							
Share of male migrants to total migrants	Distance Covered			Direction of Movements			
	Intra-district	Inter-district	Inter-State	Rural to Rural	Rural to Urban	Urban to Urban	Urban to Rural
(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
—1.35	—2.50	—5.82	—5.69	—3.59	—21.93	—5.19	—22.53
—1.75	—1.80	—1.48	2.76	—1.35	+7.91	—3.10	—52.50
—2.88	—2.24	—4.27	—8.58	—2.93	—4.69	—4.62	—11.03
—2.59	—2.37	—6.00	—0.69	—2.25	—10.06	—7.15	—9.80
—3.69	—3.25	—3.47	—10.19	—4.00	+4.13	—9.09	—6.70
—3.65	—3.67	—4.25	—6.99	—3.39	—9.10	—6.66	—6.31
—2.09	—1.86	—3.73	—2.04	—2.05	—1.00	—4.33	—16.89
—2.45	—1.85	—4.87	—8.37	—2.37	—3.19	--1.82	+18.21
—17.84	—8.24	6.10	—8.69	—6.27	—1.94	—5.93	—16.33
—10.30	—9.81	—10.31	—7.23	—11.01	—3.40	—18.04	—21.68
—5.57	—4.93	—6.74	—5.93	—6.20	—4.14	—0.87	+3.86
—0.17	0.35	—3.73	—2.52	—0.07	—2.73	—5.46	—7.45
—3.01	—2.60	—6.34	—8.60	—2.78	—7.23	—15.32	—7.47
+2.20	—0.79	0.20	—10.53	+1.30	+0.43	—1.94	—11.23
+2.74	1.73	—12.51	—5.92	+0.51	--0.16	+0.39	—19.05
+11.79	0.36	—3.39	—2.86	—10.31	—3.67	—0.14	+14.78
—1.53	—0.33	—2.66	—3.75	—2.51	+0.33	—5.85	+6.37
—0.50	1.71	—3.19	—2.70	+1.68	—7.14	+2.70	+0.55
—1.69	0.02	—2.69	—2.51	—0.92	—11.45	—5.04	+1.54
—3.07	—1.33	1.47	—15.35	—3.57	+4.91	+6.86	+6.60
—2.85	—1.46	—3.62	—7.24	—2.74	—16.85	—5.56	+5.85

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Malda	—4.64	+0.51	+0.55	—0.17	+8.97	+0.18	—0.74	+0.11
Murshi-dabad	—3.74	—1.60	+1.13	—0.04	+9.49	+0.31	—0.63	+0.66
Nadia	—7.55	+0.52	+1.06	—0.14	+2.74	—1.13	+2.28	—0.38
24-Parganas	—7.29	—1.54	+1.59	—1.53	+1.77	—9.85	+1.74	+0.27
Howrah	—11.54	+5.46	—0.73	—3.62	+9.22	—18.51	—3.62	+0.70
Calcutta	—19.21	—	—0.52	—6.61	—	—12.04	+1.21	—
Hooghly	—7.54	+1.39	+0.95	—2.06	+3.35	—7.75	—0.09	+0.62
Burdwan	—5.33	—1.95	+8.72	—0.97	—1.04	—4.05	+1.65	+0.20
Birbhum	—3.16	+0.63	+0.44	+0.15	—0.45	—0.91	+0.43	+0.88
Bankura	—3.95	+0.14	+0.08	—0.22	+0.40	+3.45	—0.20	+0.83
Midnapore	—4.12	—0.06	+0.29	+0.01	+0.67	—2.07	+0.23	+0.82
Purulia	—3.70	+1.29	+1.67	+1.31	—4.07	+2.03	+0.52	+1.15
Sambalpur	—1.90	—6.66	+3.14	+2.05	—3.13	+6.36	+0.55	+0.84
Sundergarh	—0.47	—7.38	+6.38	+1.14	—8.38	+11.96	—3.42	+2.25
Keonjhar	+8.77	—3.17	+2.95	+2.41	—6.70	+3.00	+0.67	+3.07
Mayurbhanj	+0.99	—1.80	+1.39	—0.02	—2.00	+0.33	+0.16	+0.88
Balasore	+0.77	—0.83	+0.37	+1.15	—7.48	+0.47	—0.96	+1.21
Cuttack	—4.76	+2.47	—2.46	+0.67	—4.95	+3.27	—1.12	+1.36
Dhenkanal	—4.82	—2.43	+2.99	—0.31	—9.58	+0.88	+0.37	+3.24
Baudh Khondmals	—0.60	—0.61	+0.90	—0.05	—4.12	+0.30	+0.40	+0.41
Bolangir	—0.48	+3.31	—2.99	+0.25	+2.44	+3.20	—1.55	—1.22
Kalahandi	—3.31	+3.82	—2.26	—1.38	—11.04	+3.02	+1.19	+5.30
Koraput	+4.46	—10.95	—0.12	+3.99	—4.64	+3.19	+0.18	+1.20
Ganjam	+1.80	—1.65	+0.21	+0.49	—5.53	+3.72	—0.11	+1.82
Puri	+1.51	—1.44	+1.12	+0.84	—1.12	+3.58	+1.09	—1.01
Eastern India average	—3.50	—1.01	+1.36	—0.03	—1.93	+0.19	+0.44	+1.25

(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
—1.66	—2.07	—1.36	—0.26	+0.44	+5.67	+37.30	—0.31
+14.55	—0.41	—0.82	—5.45	—0.29	—2.68	—5.01	+1.08
—1.77	—1.22	—1.23	—7.57	+0.57	—26.37	—19.28	—24.61
—2.38	—2.99	—3.69	—0.97	—6.20	—17.79	—6.08	—45.91
—6.17	—4.55	—4.50	7.88	+1.99	—8.52	+0.09	+0.64
+2.67	—	+2.99	+2.01	—	+4.50	—1.41	—
—2.13	—0.63	—3.14	1.15	+0.04	—8.00	—0.68	+6.75
—0.41	10.82	2.04	—1.12	+16.05	—5.12	—3.89	+1.28
+1.09	1.47	—0.41	—0.48	+1.93	—8.81	—7.26	+1.14
—0.46	1.13	0.76	—0.35	+1.57	—3.13	—5.12	+9.07
+1.27	1.01	—0.15	11.49	+1.50	+7.49	—3.56	+4.54
1.46	—0.88	3.38	3.12	+1.84	—2.91	—11.78	+5.41
10.06	11.62	5.55	1.63	+10.26	+6.75	—1.12	—0.10
8.06	8.08	2.33	5.70	+10.46	—2.55	—7.78	+11.98
6.80	11.30	—6.11	—10.50	+5.04	—3.29	—2.13	+23.74
3.66	3.20	—0.06	4.75	+3.09	—1.56	—8.54	—6.41
0.74	1.82	2.35	—2.38	+2.54	+4.34	+2.76	—19.17
9.42	9.83	10.14	3.36	+3.88	+6.39	+30.89	—5.63
2.75	4.43	3.98	—2.05	+3.25	+3.17	+27.56	—0.84
7.15	7.67	6.97	—7.71	+6.75	+32.26	+44.07	—5.22
0.37	1.18	—3.40	—5.28	—0.63	+9.87	+17.61	—16.41
3.25	1.51	16.62	13.91	+1.23	—0.78	—0.83	—3.39
6.47	5.64	7.70	1.68	+17.49	—1.60	+6.80	+2.04
4.93	6.15	—4.99	+3.11	+5.76	—9.41	—12.31	—3.81
6.22	4.49	13.31	—0.19	—3.96	+2.54	+20.87	+18.54
0.59	+0.73	—0.99	—2.71	+0.55	—3.41	+0.11	—4.41

APPENDIX—C : **Direction of Movements of Total Migrants Classified**

	Rural to Rural			Rural to Urban		
Districts	Intra-district	Inter-district	Inter-State	Intra-district	Inter-district	Inter-State
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Patna	79.83	19.19	0.20	49.22	45.93	4.83
Gaya	86.32	13.41	2.02	73.33	24.00	2.66
Shahabad	85.30	7.94	6.74	71.28	19.67	9.03
Saran	90.15	45.17	5.33	78.17	11.57	10.24
Champaran	89.21	7.10	3.68	70.19	21.73	8.07
Muzaffarpur	85.90	13.89	1.97	66.33	30.40	3.25
Darbhanga	87.63	12.26	6.96	68.68	27.63	3.68
Mongher	79.18	20.45	3.63	64.37	31.39	4.22
Bhagalpur	73.68	25.68	6.27	54.92	40.35	4.71
Saharsa	77.90	21.89	2.06	52.61	44.06	3.32
Purnea	73.51	20.22	6.25	31.12	55.38	13.49
Santal Parganas	84.46	93.38	6.14	44.58	42.39	13.02
Palamu	85.43	11.18	3.38	59.36	35.76	4.86
Hazaribagh	85.01	12.96	2.01	38.11	41.76	20.11
Ranchi	88.55	6.49	4.94	39.27	43.30	17.42
Dhanbad	58.44	23.15	18.40	13.15	58.65	28.19
Singhbhum	80.73	5.90	13.31	26.36	33.88	39.75
Darjeeling	53.37	6.92	39.69	25.00	11.88	63.10
Jalpaiguri	50.24	9.68	40.07	34.32	13.00	52.67
Cooch-Behar	78.52	4.98	16.48	26.26	18.60	55.12
West Dinajpur	72.48	10.68	16.82	41.22	15.99	42.78
Malda	93.72	6.27	10.30	51.44	20.21	28.33
Murshidabad	86.25	10.91	2.83	66.52	23.50	9.96
Nadia	48.98	18.99	6.71	49.15	32.56	18.28
24-Parganas	85.89	10.86	3.24	78.92	42.31	29.54
Howrah	84.75	12.15	3.08	26.34	19.50	54.15

by Distance Covered, 1971 (in percentage)

Urban to Urban			Urban to Rural		
Intra-district	Inter-district	Inter-State	Intra-district	Inter-district	Inter-State
(8)	(9)	(10)	(11)	(12)	(13)
33.29	45.23	21.46	73.34	21.59	5.05
34.6!	50.00	15.38	66.00	28.00	8.00
35.64	40·12	24.22	63.70	20.62	15.67
38.80	35.85	25.33	60.47	22.32	17.19
47.82	34.15	18.01	69.14	17.77	13.07
25.24	54.49	20.26	57.87	32.33	9.78
36.63	46.17	17.29	63.15	28.45	8.49
39.95	42.56	17.47	55.64	36.72	7.62
25.84	53.38	20.76	53.63	39.08	7.27
23.27	61.40	15.31	38.95	52.54	8.49
16.38	49.09	34.51	40.48	40.33	18.18
19.92	46.88	33.18	54.97	31.50	13.50
27.06	55.90	17.03	55.74	31.31	12.93
27.31	44.08	28.59	47.25	39.12	13.61
15.51	44.43	40.05	58.71	19.41	21.86
12.80	40.17	47.01	34.43	28.20	37.36
16.86	25.50	57.63	42.24	20.61	37.13
21.82	38.82	39.35	60.39	13.90	25.70
14.28	50.11	35.60	29.34	40.48	30.17
19.79	49.89	30.31	60.59	23.52	15.87
23.00	57.18	29.80	28.70	27.62	43.67
44.23	30.85	24.90	39.76	33.12	27.10
33.37	51.83	14.79	59.79	28.93	11.27
19.89	66.84	13.26	33.49	56.44	10.05
19.94	60.87	19.18	41.27	51.59	7.12
24.00	46.94	29.04	41.64	48.16	10.19

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Calcutta	—	—	—	—	31.42	68.57
Hooghly	67.64	24.31	8.03	20.63	22.29	57.06
Burdwan	58.48	20.00	21.51	28.57	28.52	42.89
Birbhum	76.34	14.30	9.35	57.16	22.40	20.43
Bankura	85.89	12.73	1.36	35.50	7.41	1.78
Midnapore	91.02	4.95	4.01	80.84	19.15	26.21
Purulia	82.02	7.50	10.46	51.14	20.18	28.67
Sambalpur	71.18	14.54	6.26	45.29	30.95	23.75
Sundergarh	74.75	13.80	11.44	19.24	38.59	42.15
Keonjhar	74.36	18.12	7.51	38.72	24.02	37.24
Mayurbhanj	84.63	7.95	7.41	59.09	22.23	18.72
Balasore	80.02	11.30	8.66	57.35	16.68	13.68
Cuttack	91.78	6.37	1.84	58.22	29.00	12.76
Dhenkanal	88.56	10.67	0.75	68.14	27.58	4.27
Baudh Khondmals	83.94	15.81	0.24	52.85	54.53	0.60
Bolangir	89.17	10.37	4.49	66.38	23.74	9.87
Kalahandi	68.84	8.96	2.18	53.32	31.22	15.45
Koraput	84.78	7.12	8.08	49.24	24.41	26.34
Ganjam	94.57	1.89	3.52	81.75	80.66	9.58
Puri	91.32	8.36	0.30	44.65	42.32	13.01
Eastern India average	78.10	14.58	7.60	49.31	28.93	22.02

(8)	(9)	(10)	(11)	(12)	(13)
—	24.94	75.05	—	—	—
23.56	54.82	21.60	37.94	60.64	1.40
19.04	48.64	32.31	40.25	33.63	26.10
17.98	56.01	25.99	36.30	49.11	14.57
33.28	53.27	13.43	58.24	34.61	7.13
19.09	37.06	43.83	65.63	24.29	10.06
15.61	41.62	42.76	67.09	18.46	14.43
16.10	37.81	46.08	70.31	21.80	15.35
4.14	25.79	70.05	58.98	27.96	13.04
11.42	31.87	56.70	76.82	17.96	5.20
10.00	57.70	42.29	46.86	29.69	23.43
8.69	46.10	44.99	55.10	21.43	23.45
14.61	47.49	37.89	73.73	16.41	9.79
18.53	66.40	15.05	75.31	24.31	0.36
10.21	82.84	6.93	31.21	59.26	9.51
28.40	37.84	33.75	57.44	26.71	15.83
19.82	46.65	33.51	81.00	13.81	5.17
26.67	26.38	46.93	50.29	19.61	30.08
47.98	24.44	27.56	71.64	11.55	16.79
11.63	58.08	30.28	47.73	37.62	14.63
22.91	46.27	31.23	52.79	30.05	15.06

APPENDIX—D : **Direction of Movements of Male Migrants Classified**

Districts	Rural to Rural			Rural to Urban		
	Intra-district	Inter-district	Inter-State	Intra-district	Inter-district	Inter-State
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Patna	81.16	18.09	0.73	6.93	83.85	9.20
Gaya	80.73	17.43	1.83	70.96	25.80	3.22
Shahabad	78.20	13.20	8.59	65.21	24.16	10.62
Saran	82.99	9.35	7.64	70.20	16.80	12.99
Champaran	81.29	10.61	80.09	60.04	31.53	8.21
Muzaffarpur	81.13	17.91	0.89	63.39	32.42	4.18
Darbhanga	83.19	16.12	0.67	63.42	31.92	4.64
Mongher	79.23	20.07	0.68	53.14	39.59	7.25
Bhagalpur	72.33	26.12	1.54	47.01	47.76	5.22
Saharsa	70.25	29.05	0.68	47.80	47.67	4.51
Purnea	56.28	34.43	9.28	27.29	59.75	12.94
Santal Parganas	80.09	10.61	9.29	40.80	46.82	12.37
Palamu	79.81	15.65	4.52	54.86	40.13	5.00
Hazaribagh	64.61	28.65	6.72	28.66	48.58	22.74
Ranchi	78.04	14.59	7.36	31.99	49.38	18.61
Dhanbad	35.82	38.74	25.42	7.75	63.50	28.73
Singhbhum	70.16	14.61	15.21	22.42	37.56	40.01
Darjeeling	45.80	6.67	47.52	19.92	9.89	70.17
Jalpaiguri	44.87	8.92	46.20	21.14	11.57	66.27
Cooch Behar	68.25	6.22	25.51	23.04	18.72	58.23
West Dinajpur	57.65	14.13	28.22	40.04	14.16	45.79
Malda	74.11	9.08	16.80	48.87	18.22	32.89
Murshidabad	82.44	11.79	5.76	61.25	24.29	14.45
Nadia	73.09	24.97	1.92	37.59	29.88	32.52
24-Parganas	66.32	24.27	9.40	36.12	25.89	37.97
Howrah	58.86	14.64	26.49	58.86	14.64	26.69

by Distance Covered by, 1971 (in percentage)

Urban to Urban			Urban to Rural		
Intra-district	Inter-district	Inter-State	Intra-district	Inter-district	Inter-State
(8)	(9)	(10)	(11)	(12)	(13)
26.85	49.48	23.66	7.95	66.41	25.63
30.00	50.00	20.00	45.45	36.36	18.18
34.04	40.95	25.00	44.14	25.24	30.61
31.02	41.70	27.27	43.17	23.77	33.05
37.53	40.61	21.84	59.50	21.33	19.15
17.90	57.99	24.10	44.97	32.83	22.18
29.31	50.08	20.60	34.34	47.43	18.22
36.87	41.86	21.26	36.87	41.86	21.26
22.40	55.74	21.85	41.06	42.81	16.11
21.32	60.52	18.15	33.76	55.26	10.96
13.31	50.57	36.11	40.93	37.83	21.23
19.00	46.96	34.03	33.88	38.82	27.28
28.11	54.75	17.09	48.00	35.99	16.00
27.26	44.01	28.71	33.82	43.86	22.31
14.40	47.28	38.31	32.98	30.02	36.98
10.54	42.56	46.88	19.65	31.92	48.42
15.21	27.82	56.96	45.05	23.01	31.92
20.36	34.26	45.36	59.21	14.20	26.57
16.90	43.63	39.46	23.57	40.56	35.86
18.67	46.77	34.55	57.58	23.82	18.59
18.69	44.62	36.67	26.34	26.30	47.34
6.15	63.33	30.51	33.13	36.49	30.36
32.72	50.71	16.56	54.84	30.89	14.26
16.86	65.15	17.97	29.22	57.70	13.07
19.45	32.60	47.93	28.59	60.51	10.89
19.22	40.26	40.50	32.76	49.54	17.68

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Calcutta	—	—	—	—	67.64	84.99
Hooghly	43.52	32.17	24.29	7.43	17.99	74.56
Burdwan	42.19	18.73	39.06	23.60	27.57	48.82
Birbhum	68.74	15.32	15.93	54.74	22.70	22.55
Bankura	79.80	15.94	4.24	76.15	15.39	8.44
Midnapore	86.17	5.75	8.06	61.75	12.70	25.53
Purulia	75.23	9.39	15.37	42.90	21.95	35.14
Sambalpur	77.69	15.13	7.16	38.38	33.87	27.73
Sundergarh	65.79	17.50	16.69	15.33	41.09	43.56
Keonjhar	77.07	16.54	6.37	33.87	26.72	39.40
Mayurbhanj	83.31	7.96	8.71	56.90	26.30	16.79
Balasore	68.66	17.09	14.24	53.46	31.28	15.24
Cuttack	87.00	8.25	4.73	58.22	29.00	12.76
Dhenkanal	79.52	18.47	2.00	64.20	30 51	5.28
Baudh Khondmals	77.40	22.15	0.43	49.11	49.34	1.54
Bolangir	87.41	11.07	1.51	62.17	26.37	11.45
Kalahandi	78.91	17.11	3.97	48.38	35.30	16.30
Koraput	56.35	8.84	34.79	43.05	30.03	26 91
Ganjam	93.34	2.52	4.13	77.91	12.15	9.92
Puri	85.41	13.47	1.10	40.13	46.63	13.22
Eastern India average	72.01	16.21	11.90	44.81	32.52	24.70

(8)	(9)	(10)	(11)	(12)	(13)
—	56.82	71.15	—	—	—
21.83	47.16	31.00	29.99	53.45	16.54
18.26	46.56	35.16	35.81	30.65	33.53
15.68	57.17	27.14	27.99	56.34	15.66
45.94	32.14	21.90	61.23	30.42	83.39
16.53	34.66	48.80	61.97	22.59	15.42
13.92	44.05	42.01	72.27	15.45	12.26
13.19	38.86	47.93	52.20	24.88	22.91
3.37	26.32	70.30	60.56	20.67	18.75
9.92	30.32	59.74	74.97	19.35	5.67
11.52	52.41	36.05	43.55	25.33	31.11
7.75	45.41	46.83	34.64	24.18	41.17
13.36	46.65	39.98	49.52	29.14	21.32
18.88	68.08	13.03	71.22	28.57	0.20
13.76	80.18	6.04	30.68	69.31	11.36
27.07	37.47	35.45	58.88	20.81	20.30
18.40	50.40	34.40	69.97	22.69	7.33
24.93	27.84	47.21	45.98	20.05	33.95
45.83	27.10	27.05	61.13	18.94	19.92
11.30	59.95	28.73	39 14	39.55	21.29
20.79	46.39	33.20	43.83	34.38	23.69

APPENDIX—E : **Change in Direction of Movements of Male Migrants**

Districts	Rural to Rural			Rural to Urban		
	Intra-district	Inter-district	Inter-State	Intra-district	Inter-district	Inter-State
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Patna	5.84	—4.50	—1.31	—32.61	30.74	1.86
Gaya	—1.55	1.48	0.08	2.74	—0.61	—2.14
Saran	—0.08	0.79	—0.60	1.67	—0.92	—0.75
Champaran	3.31	—0.97	—2.35	—5.44	5.87	—0.44
Muzaffarpur	—1.87	2.01	—0.15	—1.59	2.46	—0.87
Darbhanga	0.74	—0.70	—0.04	0 56	0.97	—1.54
Mongher	2.11	—1.51	—0.62	—1.91	3.47	—1.56
Bhagalpur	—4.20	4.64	—0.48	—1.60	3.61	—2.01
Saharsa	2.61	—1.91	—0.73	—4.81	—4.20	—0.62
Purnea	—0.93	0.39	0.54	8.61	—3.20	—5.42
Santal Parganas	1.32	—1.92	0.60	3.66	—0.01	—3.65
Palamu	—1.07	1.87	—0.78	0.21	0.91	—1.71
Hazaribagh	3.59	0.03	—3.62	—1.87	11.18	—9.32
Ranchi	7.45	0.90	—8.33	—10.38	9.73	0.65
Dhanbad	14.73	—12.21	—2.51	—2.30	1.85	0.44
Singhbhum	3.74	1.67	—5.13	1.25	9.94	—11.19
Darjeeling	0.94	0.04	—0.97	1.96	3.10	—5.07
Jalpaiguri	1.28	2.78	—4.06	1.40	—2.44	1.03
Cooch-Behar	—0.53	0.05	0.47	6.87	6.46	—13.82
West Dinajpur	0.33	—0.14	—0.22	20.44	3.38	—23.81
Malda	—0.96	0.30	0.77	11.04	—3.40	—7.65
Murshidabad	—0.80	0.59	0.22	2.92	2.50	—5.42
Nadia	6.99	0.50	—7.50	16.17	11.06	—27.23
24-Parganas	4.27	3.21	—7.48	7.45	—2.78	—4.67
Howrah	—0.17	0.59	—0.41	43.20	—1.73	—41.72
Calcutta	—	—	—	—	5.53	4.18

Classified by Distance Covered, 1961-71 (in percentage change)

Urban to Urban			Urban to Rural		
Intra-district	Inter-district	Inter-State	Intra-district	Inter-district	Inter-State
(8)	(9)	(10)	(11)	(12)	(13)
−11.06	12.40	−1.33	−49.69	40.03	9.66
1.14	5.47	−6.59	11.08	−3.94	−7.13
−21.67	17.11	5.07	12.81	−4.15	−8.65
−6.84	7.96	−1.12	−3.38	4.35	−0.98
−30.59	26.80	3.8	5.06	−2.99	−2.07
−1.11	4.88	5.75	−5.61	0.83	4.78
−2.88	5.96	−3.07	−3.70	5.12	−1.42
−16.22	17.37	−1.15	−14.57	12.09	2.47
−8.58	9.74	−1.12	−28.88	30.04	−1.16
−6.77	11.34	−4.57	−16.43	6.22	10.22
2.10	4.17	−6.26	0.78	5.30	6.08
0.58	2.03	−2.64	−2.61	1.73	0.88
6.78	6.68	−13.48	1.98	9.77	−11.75
−5.75	6.57	−0.81	7.72	8.16	−15.88
−10.28	7.18	3.09	−6.51	1.03	13.92
−4.86	5.10	−0.23	5.67	1.80	−7.48
−11.40	8.38	3.01	2.07	−0.08	−2.00
3.35	−13.12	9.74	0.93	−1.06	0.02
−3.20	21.77	−18.57	−6.05	5.64	0.41
3.88	11.29	−15.18	−4.42	−4.46	8.88
−35.51	34.17	1.35	−6.87	−3.51	10.36
−11.21	18.90	−7.68	−0.16	−4.11	4.26
−14.06	31.70	−17.65	−1.81	−0.92	2.73
−8.55	−15.40	23.93	−1.54	1.61	−0.06
−8.46	5.92	3.54	0.56	−3.00	2.43
—	−6.83	−0.44	—	—	—

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Hooghly	—0.32	0.64	—0.33	—5.89	—2.97	8.86
Burdwan	—26.11	—12.29	38.40	—8.90	9.82	—0.93
Birbhum	0.63	—0.80	0.23	10.01	—6.24	—3.76
Bankura	—0.25	0.08	0.17	10.32	—4.61	—5.72
Midnapore	—0.35	0.48	—0.14	10.56	—8.12	—2.74
Purulia	—0.16	—0.03	0.20	—1.25	3.77	—2.52
Sambalpur	0.56	—0.10	—0.49	0.69	8 66	—9.36
Sundergarh	5.80	—1.54	—4.25	—16.93	13.36	3.56
Keonjhar	10.96	—7.69	3.38	4.84	4.85	—9.69
Mayurbhanj	0.85	—0.16	0.06	1.88	—0.36	—1.52
Balasore	4.79	—3.01	—1.83	2.17	—1 64	—0.54
Cuttack	15.96	—11.11	—4.89	0.55	—2.28	2.82
Dhenkanal	0.89	0.71	—1.66	9.06	6.70	2.31
Baudh Khondmals	5.23	—4.43	—0.88	0.87	0.22	—1.09
Bolangir	10.16	—8.28	—1.91	0.48	—2.47	2.96
Kalahandi	1.45	—0.03	—1.49	2.33	—0.74	—1.59
Koraput	—23.18	—4.00	27.17	—8.32	5.12	3.21
Ganjam	0.66	—0.39	—0.29	25.62	—10.23	—15.40
Puri	4.59	—3.61	—0.95	—2.08	3.97	—1.89
Eastern India average	1.37	—1.26	—0.11	+2.14	2.42	—4.33

(8)	(9)	(10)	(11)	(12)	(13)
1.22	4.51	−5.72	4.79	−7.52	2.72
−6.14	19.31	−13.18	−0.87	−2.53	3.40
−13.48	7.17	6.31	1.52	3.40	−4.92
18.92	−16.50	−2.47	9.15	−4.99	70.89
−33.47	11.01	22.46	11.97	−9.22	−2.76
−34.13	23.28	10.85	9.12	−5.60	−3.52
−12.13	14.97	−2.85	13.29	−2.97	−10.32
−18.67	3.39	15.28	33.83	−4.33	−29.51
−13.54	0.80	12.73	39.19	−5.75	−33.44
−8.10	9.39	−1.30	−19.27	1.55	17.72
−33.97	12.28	21.70	−1.22	−2.95	4.17
−37.26	18.61	18.65	−20.99	11.98	9.01
−2.17	5.33	−3.16	21.90	−6.17	−15.73
13.76	−5.32	−8.45	7.61	−0.07	3.83
−18.18	4.35	13.84	−6.10	−5.32	11.43
4.09	9.12	−9.99	23.35	−2.85	−20.50
−9.59	−6.70	16.29	−8.80	0.97	7.83
6.02	2.88	−8.90	−19.92	10.04	2.88
−21.88	26.68	−4.80	−11.44	8.27	4.50
−7.03	8.72	.68	−0.45	1.08	0.62

APPENDIX—F : **Increase in Total and Male Migrants, 1961-71 and**

Districts	Total Popula- tion 1961	Total Popula- tion 1971	% increase in Total Migrants, 1961-71			
			Total Migrants	Intra- district	Inter- district	Inter- State
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Patna	2949746	3556945	12.89	44.88	17.86	−2.90
Gaya	3647892	4457000	11.31	10.85	20.12	−1.74
Shahabad	3218017	3939034	14.79	14.35	25.76	8.24
Saran	3584918	4279253	14.24	13.83	27.93	14.55
Champaran	3006211	3543103	7.98	9.05	85.48	−0.05
Muzaffarpur	4118398	4840681	5.69	92.01	19.79	7.21
Darbhanga	4413027	5233904	5.40	4.74	10.25	−2.52
Mongher	3387082	3892609	4.41	−0.19	22.37	3.95
Bhagalpur	1711136	2091103	12.87	7.77	32.36	−1.51
Saharsa	1723566	2350268	11.29	15.75	1.55	−22.24
Purnea	3089128	3941863	−3.08	1.90	−0.91	1.68
Santal Parganas	2675203	3186908	12.50	10.50	20.64	18.14
Palamu	1187789	1504350	15.02	12.38	33.64	20.91
Hazaribagh	2396411	3020214	22.11	17.58	48.80	6.41
Ranchi	2138565	2611445	20.52	14.14	82.69	31.22
Dhanbad	1158610	1466417	15.20	1·03	22.07	26.50
Singhbhum	2049911	2437799	4.75	0.17	47.82	0.66
Darjeeling	624600	781777	4.57	0.15	42.44	10.75
Jalpaiguri	1359300	1750159	12.39	15.80	49.88	8.12
Cooch-Behar	1019800	1414183	16.73	19.14	38.40	33.83
West Dinajpur	1323700	1859887	17.70	18.77	27.63	10.06
Malda	1221900	1612657	10.92	11.77	21.98	8 76
Murshidabad	2290000	2940204	9.50	7.13	21.05	8.05
Nadia	1713300	2230270	8.76	11.20	21.66	4.34
24-Parganas	6280900	8449482	10.25	6.36	24.64	−2.87

the Location Coefficients and Location Quotients

% increase in Male Migrants, 61-71				Location Coeffts. (LSS)			Location Quotients	
Total Male Migrants	Intra-district	Inter-district	Inter-State	Total Migrants 1971	Male Migts. 1971	Increase in Male Migrants 1961-71	Total Migrants & Total Population	Male Migrants & Total Population
(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
2.58	−1.93	+14.32	+12.82	2.31	1.94	−0.98	1.02	0.86
0.58	−3.27	+11.94	+3.13	1.19	0.71	−0.07	0.94	0.51
−3.27	−4.64	+6.42	+6.42	−25.25	1.30	0.44	1.06	0.54
−16.77	−1.86	−5.62	−14.65	2.24	0.60	−2.34	1.03	0.27
−14.63	−14.57	−6.45	−25.91	1.33	0.70	−2.35	1.00	0.53
−23.78	−28.92	−7.02	−6.97	2.09	0.76	−4.61	0.97	0.35
−12.82	−13.54	−11.00	−6.31	1.94	0.75	−2.14	0.91	0.35
−12.67	−46.02	−7.25	−14.95	1.36	0 65	−1.84	0.98	0.48
−57.28	−30.05	−2.42	−20.29	1.25	0.68	−17.73	0.97	0.52
−26.78	−62.59	−26.44	−33.56	1.31	1.00	−7.70	0.97	0.74
−15.28	−21.09	−13.88	−10.86	1.20	1.34	−4.63	0.96	1.07
+11.10	+13.08	+5.77	+8.41	0.41	0.78	0.53	0.99	0.67
+0.03	−1.96	+10.14	−7.09	0.43	0.33	—	1.03	0.80
+19.24	+10.90	+49.44	+3.72	0.65	0.54	+1.68	1.13	0.92
+37.63	+20.23	+33.94	−46.40	0.52	0.47	+2.48	1.05	0.94
+14.64	+2.61	+15.38	−19.61	2.76	5.07	+12.41	1.61	2.97
+5.17	−1.58	+41.14	−7.42	0.69	0.83	+0.79	1.09	1.32
+7.80	+3.92	+34.01	−6.20	0.68	1.46	+2.03	0.86	1.84
+12.01	+15.83	+41.83	+1.00	0.87	1.76	+3.64	1.06	2.13
+13.88	+14.45	+42.72	+6.21	0.79	1.19	+2.83	0.68	1.03
+9.76	+12.46	+11.61	+2.28	0.93	1.21	+2.09	0.83	1.08
+5.11	+1.86	+18.01	+9.39	1.12	1.10	+1.02	0.76	0.75
+153.61	+5.10	+17.61	+3.33	1.35	1.23	+1.40	0.71	0.65
+6.11	+5.99	+17.61	−6.62	1.04	1.27	+1.63	0.69	0.84
+1.29	−6.68	+16.08	−4.41	1.76	2.50	+0.62	0.92	1.30

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Calcutta	2927289	3148746	−31.67	—	−29.88	−2.43
Howrah	2038500	2428176	−20.38	−7.67	−21.25	−28.80
Hooghly	2231400	2872116	3.73	7.17	−40.60	−20.55
Burdwan	3082800	3916174	9.35	4.50	24.73	4.95
Birbhum	1446200	1775909	8.85	9.87	11.90	10.43
Bankura	1664500	2031039	5.37	5.65	6.01	5.12
Midnapore	4341900	5509247	9.70	9.62	14.49	5.86
Purulia	1360000	1602875	2.59	4.39	23.30	13.74
Sambalpur	1508689	1844898	16.23	6.33	64.56	45.45
Sundergarh	758617	1030758	3.75	20.17	93.03	44.02
Keonjhar	743315	955514	40.70	31.01	66.70	80.13
Mayurbhanj	1204043	1434200	23.22	21.75	45.53	22.99
Balasore	1415923	1830504	25.85	24.54	29.81	37.91
Cuttack	3060320	3827678	6.18	9.34	15.17	27.00
Dhenkanal	1028935	1293914	5.21	2.31	35.25	−18.43
Baudh Khond-mals	514427	621675	18.66	17.77	21.94	8.70
Bolangir	1068686	1263657	16.51	21.20	−8.36	−31.25
Kalahandi	1009654	1163889	2.50	7.36	−14.55	−24.65
Koraput	1498271	2043281	57.45	36.56	55.47	—
Ganjam	1872530	2293808	30.24	27.89	38.21	43.32
Puri	1865439	2340859	31.73	29.32	42.16	75.07

(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
−21.31	—	−26.53	−19.47	116.00	345.00	1796.50	0.97	2.88
−28.18	−26.92	−29.36	−21.61	5.02	7.28	−54.83	0.88	1.28
−1.81	+1.84	−0.49	−6.46	3.14	4.33	−1.55	1.03	1.41
+7.91	+1.14	+30.84	+3.21	2.06	3.55	+5.01	1.10	1.90
+14.93	+17.50	+10.43	+9.35	1.18	1.21	+3.01	0.87	0.89
+2.83	+2.52	+9.27	−5.70	0.92	0.67	+0.35	0.89	0.65
+16.24	+15.13	+13.92	+24.17	1.32	1.21	+3.27	0.94	0.86
+12.56	+8.78	+37.73	+21.04	0.80	0.73	+1.79	0.95	0.88
+39.18	+60.00	+89.34	+50.59	0.49	0.72	+5.41	1.33	1.96
+40.23	+55.27	+101.73	+60.10	0.52	0.94	+7.31	1.41	2.53
+44.17	+105.66	+39.72	+40.55	0.47	0.59	+5.06	1.17	1.47
+31.35	+66.10	−65.11	−17.51	0.51	0.51	+3.06	1.07	1.05
+23.51	+41.20	+20.79	28.67	1.03	0.75	+3.46	1.03	0.75
+64.98	+83.71	+12.42	+34.88	1.17	1.22	−9.26	0.98	1.02
+23.66	+28.89	+50.09	−21.37	0.38	0.35	+1.65	0.91	0.86
+35.97	+62.88	+43.55	−5.86	0.23	0.27	+1.95	1.19	1.42
+15.50	+45.16	−16.31	+20.07	0.59	0.53	+1.60	1.18	1.07
+14.39	+15.06	+29.29	+6.54	0.33	0.34	+0.98	0.97	1.01
+44.61	+18.58	+81.14	+154.93	0.29	0.39	+3.38	1.16	1.54
+37.77	+72.72	+24.24	+3.17	0.17	0.69	+4.99	1.10	1.08
+45.67	+43.26	+106.71	+74.46	0.95	0.82	+7.19	1.18	1.02

APPENDIX—G : **Indicators of**

Districts	% of Urban in total population	% of workers in total population	% of workers in nonagricultural activities	Cultivable area per agricultural worker (acres)	Net area sown per agricultural worker (acre)	Area sown more than once as % to N.A.S.	Average daily wage of agricultural labourer
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Patna	22.54	30.35	24.7	1.40	1.33	50.29	3.41
Gaya	7.62	30.69	18.2	1.89	1.54	28.94	2.53
Shahabad	8.22	29.29	18.9	2.16	2.02	47.59	2.70
Saran	4.19	36.62	12.3	1.41	1.22	34.83	2.96
Champaran	5.36	34.86	10.1	1.55	1.42	47.61	3.26
Muzaffarpur	5.24	29.43	12.5	1.26	1.15	35.43	2.76
Darbhanga	4.43	29.30	12.6	1.25	1.11	31.49	2.58
Mongher	11.87	30.82	17.5	1.63	1.18	30.80	2.80
Bhagalpur	10.98	32.01	17.6	1.72	1.35	36.36	2.86
Saharsa	4.53	35.30	14.2	1.54	1.17	42.55	3.05
Purnea	6.34	33.23	9.5	1.92	1.56	33.25	2.33
Santal Parganas	5.76	32.69	13.8	2.70	1.57	14.54	2.53
Palamu	4.69	32.18	11.4	3.00	1.56	24.41	2.80
Hazaribagh	12.87	29.71	24.2	2.67	1.28	11.67	2.50
Ranchi	13.66	31.83	20.1	4.23	2.55	9.12	1.89
Dhanbad	43.50	33.72	64.8	2.40	1.19	6.75	3.03
Singhbhum	26.24	33.19	31.4	3.08	1.74	4.62	2.45
Darjeeling	23.05	36.12	60.4	2.39	2.22	12.09	3.36
Jalpaiguri	9.60	31.12	50.0	3.13	3.08	15.22	3.52
Cooch-Behar	6.83	27.61	16.5	2.59	2.56	28.48	3.25
West Dinajpur	9.33	27.97	14.72	3.28	3.25	25.76	3.12
Malda	4.21	27.09	20.5	2.98	2.87	37.11	2.70
Murshidabad	8.44	25.09	24.4	2.51	2.42	47.38	2.88

Economic Development, 1970-71

% of total workers in manu-facturing	Workers in Regd. working facto-ries/lac of popu-lation	% of total workers in trade & comm-erce	Hospital beds/lac of popula-tion	% Lite-racy	% of total workers in trans-port	Surface Road Length (Km.)		No. of vehicles on road/ lac of popula-tion
						'000 Sq. Km.	Per Lac cf popula-tion	
(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
3.15	484	5.99	64	30.07	2.71	159	25.10	294
1.39	214	3.62	13	21.61	1.31	86	24.15	51
2.62	308	4.18	12	24.56	1.34	83	24.14	88
2.23	125	2.62	9	19.21	1.08	138	22.34	44
1.47	163	2.16	11	14.57	0.61	90	23.40	84
1.33	144	2.85	7	17.33	0 89	124	20.17	72
1.44	189	2.62	19	18.03	1.11	130	21.60	41
3.16	526	3.54	8	20.40	1.85	98	24.86	66
1.99	338	3.44	16	21.50	1.40	118	32.12	53
0.58	140	2.01	7	15.48	0 40	90	22.82	42
1.25	224	3.25	8	15.72	1.10	83	23.35	50
1.55	187	2.37	12	15.93	1.33	80	35.89	41
1.20	246	2 03	10	15.12	1.07	56	48.02	68
1.92	1104	2.84	15	16.42	1.61	54	32.71	121
4.13	1166	2.83	129	23.23	1.62	60	42.51	349
8.94	2045	6.70	24	29.51	6.12	242	50.13	985
11.84	2874	3.50	14	25.86	3.12	63	35.57	548
3.11	1113	6.74	182	33.07	5.40	37	146	602
2.69	1160	5.47	36	24.00	3.47	19	68	159
1.73	42	3.97	33	21.92	1.33	20	49	74
1.71	118	3.71 -	15	22.11	1.14	12	35	24
2.39	37	3.76	20	17.60	1.74	13	29	33
2.23	44	4.29	32	19.65	1.42	17	31	51

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Nadia	18.74	24.77	34.70	2.81	2.76	52.79	2.12
24-Parganas	35.15	25.86	48.0	1.87	1.85	16.07	2.85
Howrah	41.92	26.57	67.5	1.70	1.53	17.64	3.35
Calcutta	100.00	37.01	99.9	—	—	—	—
Hooghly	26.47	26.98	45.0	1.75	1.72	25.84	3.25
Burdwan	22.77	27.93	45.2	2.59	2.56	8.50	3.40
Birbhum	7.02	26.64	20.7	2.66	2.61	18.21	2.75
Bankura	7.42	28.30	18.6	2.27	1.97	6.87	3.25
Midnapore	7.62	26.69	19.6	2.27	1.97	8.09	3.12
Purulia	8.25	31.10	21.4	1.43	1.23	9.02	2.00
Sambalpur	12.02	35.33	24.4	3.07	2.55	16.9	2.56
Sundergarh	23.50	31.44	40.1	3.14	2.34	9.3	2.20
Keonjhar	7.04	30.60	24.7	2.98	2.22	11.9	2.09
Mayurbhanj	2.78	33.34	16.4	1.98	1.68	13.2	1.59
Balasore	5.47	26.97	15.5	2.66	2.55	12.5	2.44
Cuttack	7.98	27.48	25.7	2.42	2.15	48.4	2.56
Dhenkanal	4.00	30.08	21.6	3.47	2.64	22.9	2.68
Baudh Khondmals	3.14	35.29	15.9	2.08	1.86	30.4	2.32
Bolangir	6.85	33.59	17.1	2.89	2.43	22.1	1.79
Kalahandi	4.85	32.73	14.4	2.74	2.07	24.8	2.37
Koraput	8.18	35.09	17.6	4.00	2.79	16.6	1.93
Ganjam	11.32	32.54	26.5	1.80	1.39	56.5	2.56
Puri	9.78	29.07	27.8	2.48	2.04	53.6	2.72

(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
6.18	251	7.26	155	31.31	2.66	28	49	38
19.76	4072	8.13	43	38.44	3.94	25	40	33
32.67	6296	12.77	72	40.59	7.55	52	32	70
27.12	645	28.98	372	60.31	13.66	769	25	2923
17.91	2959	7.94	59	38.82	3.45	36	23	171
11.22	2245	6.14	50	34.35	4.49	24	42	401
2.73	259	3.44	43	26.57	1.46	17	45	40
2.51	158	2.87	70	26.29	1.25	21	70	45
2.93	294	2.41	34	32.87	2.74	15	38	47
2.94	162	2.73	70	21.50	2.97	7	28	48
3.75	696	3.04	65.6	27.11	1.67	5.3	50.4	336
10.68	2547	4.48	100	26.46	3.56	4.3	45.8	875
1.44	132	2.25	38	21.25	1.54	4.0	37.0	287
0.69	57	1.32	35	18.05	0.64	5.7	40.2	98
1.44	163	2.45	21	33.71	1.46	9.6	35.9	99
3.15	435	4.71	69	36.42	1.99	8.0	23.4	386
1.22	54	1.96	34	27.76	0.78	5.7	49.7	110
0.49	13	2.35	66	19.78	1.41	6.1	109.5	53
1.13	89	2.21	28	19.92	0.93	4.0	27.4	112
0.93	106	1.81	49	13.85	0.54	4.0	42.7	100
1.36	454	2.43	40	10.58	1.10	3.6	50.5	135
1.81	133	5.01	57	24.41	1.31	12.1	64.6	143
1.88	132	4.96	47	35.34	1.90	8.8	40.5	175

APPENDIX— H : **Indicators of**

Districts	% of Urban in total popu- lation	% of Work- ers in total popu- lation	% of Work- ers in non- Agri- cultu- ral activi- ties	Culti- vable area per agri- cultu- ral work- er (acres)	Net area sown per agri- cultu- ral work- er (acre)	Area sown more than once as% to N.A.S.	Aver- age daily wage of agri. labo- urer	% of total work- ers in manu- factu- ring	Work- ers in Regd work- ing fact- ories per lac popu.	% of total work- ers in trade and com- mer- ce
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Patna	10	25	15.5	43	37	4	2	13.5	15	9
Gaya	26.5	23	28	32	32	18	31.5	36	25	20
Shahabad	23	30	26	28	20	7	24.5	20	19	16
Saran	43	42	43	42	40	13	15	23.5	37	32.5
Champaran	36	7	45	39	34	6	6	32	28.5	41
Muzaffarpur	37	29	42	44	44	12	21	38	32	28
Darbhanga	41	28	41	45	45	15	27	34	26	32.5
Mongher	15	22	31	38	42	16	19.5	12	14	21
Bhagalpur	17	17	29.5	36	36	11	17	25	18	23.5
Saharsa	40	4	39	40	43	9	13	45	33	43
Purnea	33	11	46	31	30 5	14	37	39	24	25
Santal Parganas	34	14	40	14	29	32	31.5	31	27	37
Palamu	39	16	44	9	30.5	23	19.5	41	23	42
Hazaribagh	13	27	19	16	38	37	33	26	11	29
Ranchi	12	18	24	1	11	39	43	10	8	30
Dhanbad	2	8	3	24	41	44	14	8	7	7
Singhbhum	6	12	11	7	26	45	34	5	4	22
Darjeeling	8	2	4	25	16.5	35	4	15	10	6
Jalpaiguri	19	20	5	6	2	31	1	19	9	11

Economic Development, 1970-71 (Ranks)

of Economic Development

Hospitable beds per lac of population	%- of Literacy	% of total workers in transport	Surface Road Length (Km.)		No. of vehicles on road per lac of population	Agricultural activity	Industrial activity	Transport activity
			'000 Sq. Km.	Per lac of population				
(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
12	12	13	3	35	10	18	14	8
37	26	31.5	11	38	32.5	38	29	33
38.5	20	28	12.5	39	23	14	20.5	27.5
42	34	38	4	44	38	35	27.5	40
40	44	44	9.5	40.5	24	17	27 5	36
45.5	38	41	6	46	26	40	39	37
32	36	37	5	45	40.5	43	26	43
43.5	30	17	8	37	29	39	12	17 5
33	27	27	7	29	30.5	27	22	19.5
45.5	42	46	9.5	43	39	31	41	45
43.6	41	35.5	12.5	42	34	37	33	40
38.5	40	29.5	14	25	40.5	33	25	31
41	43	39	17	12	28	16	34	21
34.5	39	21	18	28	17	42	18	15
4	23	20	16	16	8	21.5	9	7
29	13	3	2	8	2	41	7	1
36	19	10	15	26	5	36	4	5
2	9	4	20	1	4	14	11	2
22	22	8	7	4	14	3	13	4

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Cooch Behar	32	35	33	19.5	8.5	19	8	29	44	17
West Dinajpur	20	33	37	4	1	20	11	30	38	19
Malda	42	37	23	10.5	3	10	24.5	22	45	18
Murshidabad	21	45	17.5	21	14	8	16	23.5	43	15
Nadia	11	46	10	13	5	3	11	9	22	5
24-Parganas	4	44	6	33	25	30	18	3	2	3
Howrah	3	43	2	37	33	27	5	1	1	2
Calcutta	1	1	1	—	—	—	—	2	13	1
Hooghly	5	38	8	35	27	21	8	4	3	4
Burdwan	9	34	7	19.5	8.5	41	3	6	6	8
Birbhum	30	41	22	17.5	7	26	22	18	21	23.5
Bankura	28	32	27	26.5	22.5	43	8	21	30	27
Midnapore	26.5	40	25	26.5	22.5	42	11	17	20	36
Purulia	22	21	21	41	39	40	41	16	20	31
Sambalpur	14	3	17.5	8	11	28	29	11	12	26
Sundergarh	7	19	9	6	15	38	39	7	5	14
Keonjhar	29	24	15.5	10.5	16.5	36	40	34	35.5	39
Mayurbhanj	46	10	34	30	28	33	45	44	41	46
Balasore	35	39	36	17.5	11	34	35	34	28.5	34
Cuttack	25	36	14	23	18	5	29	13.5	17	10
Dhenkanal	44	26	20	3	6	24	26	40	42	44
Baudh Khondmals	45	5	35	29	24	17	38	46	46	38
Bolangir	31	9	32	12	13	25	44	42	40	40
Kalahandi	38	13	38	15	19	22	36	43	39	45
Koraput	24	6	29.5	2	4	29	42	37	16	35
Ganjam	16	15	13	34	35	1	29	28	34	12
Puri	18	31	12	22	21	2	29	27	35.5	13

(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
26	25	29.5	26	10.5	25	5	40	17.5
34.5	24	34	33	27	46	2	37	46
31	37	18	31	32	44.5	4	36	42
27	33	25	28.5	31	32.5	6.5	35	35
3	11	14	22	10.5	43	1	16	6
18 5	4	6	23	20	44.5	32	2	19.5
6	2	2	19	30	27	29	1	12
1	1	1	1	36	1	—	7.5	6
13	3	9	21	21	13	19	3	9
15	7	5	24	17	6	9	5.5	3
18.5	16	23.5	28.5	14	42	10	20.5	30
7.5	18	33	25	3	37	26.5	23	23
24.5	10	12	30	22	36	28	18.5	25.5
7.5	27.5	11	37	33	35	45	17	34
10.5	15	19	41	7	9	12	10	11
5	17	7	42	13	3	24	5.5	10
21	29	22	44	23	11	30	38	25.5
23	35	43	39.5	19	22	44	45	38
30	8	23.5	34	24	21	23	31.5	27.5
9	5	15	36	40.5	7	11	15	24
24.5	14	42	39.5	9	19	6.5	43	32
10.5	32	26	38	2	30.5	34	46	22
28	31	40	44	34	18	21.5	43	44
16	45	45	44	15	20	20	43	40
30	46	35.5	46	6	16	13	24	29
14	21	31.5	32	5	15	25.5	30	14
17	6	16	35	18	12	8	31.5	13

APPENDIX—I : **Change in Indicators of Economic**

Districts	% of Urban to total population	% of workers in total population	% of workers in non-agri. activity	Cultivable area per agri. worker (acres)	Net area sown per agri. worker (acres)	Area sown more than once as % to net area sown	Average daily wages of agri. workers (Rs.)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Patna	2.41	−7.24	−7.9	−0.06	−0.04	−10.12	+2.27
Gaya	0.36	−10.29	−1.0	+0.34	0.13	−23 91	+0.08
Dhanbad	1 02	−7 82	−9.1	0	0.12	−22.45	+1.63
Saran	0.01	−8.17	−5.9	−0.03	0.05	−2.90	+1.84
Champaran	0.52	−6.42	−4.4	−0 05	0.03	17.97	+2 07
Muzaffarpur	0.66	−3 99	−7.0	−0.24	−0.20	7.27	+1.47
Darbhanga	0.12	−5.91	−11.2	−0.17	−0.14	1.23	+1.43
Mongher	0.80	−7 98	−9.7	−0 15	−0.30	6.45	+1.40
Bhagalpur	0.07	−9.70	−11.3	−0.15	−0.24	−10.56	+1.43
Saharsa	0.62	−10.28	−4.0	−0.19	−0.04	24.63	+1.66
Purnea	0.34	−6.27	−14.8	−0.26	−0.06	−18.85	+0.75
Santal Parganas	0.42	−19.76	−3.7	−1.06	−0.55	−42.68	+1.28
Palamu	−0.03	−15.58	−4.9	+0.50	−0.01	1.51	+1.68
Hazaribagh	4.48	−18.70	1 4	+1 08	0.28	−13 15	+1.50
Ranchi	4.20	−24 51	4.3	+1.67	0.91	−5.60	+1.14
Dhanbad	18.48	−15.07	9.5	+0 92	0.39	−31.20	+1.63
Singhbhum	4.75	−18.52	2 0	+1.37	0.77	−41.58	+1 45
Darjeeling	−0.10	−6.48	0.8	−0.35	−0.02	−3.91	+1.21
Jalpaiguri	0.50	−7.31	−3.5	−0.42	0.15	7.12	+1.27
Cooch Behar	−0.17	−4.18	−5.8	−0.10	0.29	14.29	+0.80
West Dinajpur	1.68	−4.74	−12.2	−0.07	0.17	6.96	+0.99
Malda	0.06	−5.70	−15.3	−0.13	0.16	8.91	+1.20

Development, 1960-61 to 1970-71

% of total workers in manu-facturing	Workers in Regd. work-ing facto-ries/lac of population	% of Total workers in trade & commerce	Hospital beds/lac of popu-lation	% of Literacy	% of total workers in transport	No. of vehicles on Road per lac of popu-lation
(9)	(10)	(11)	(12)	(13)	(14)	(15)
−0.56	−64	+1.07	+11	+1.34	+0.10	+160
—0.15	+82	+0.79	+9	+2.45	+0.21	+26
0.10	−28	+0.32	—6	+2.79	+0.14	+68
1.03	−56	+0.05	−5	+0.97	+0.16	+29
0.13	—68	+0.17	—7	+1.41	+0.07	+53
0.43	+22	+0.21	−4	+0.17	+0.08	+48
0.28	−25	—0.29	+1	+1.28	+0.25	+28
0.54	+9	+0.11	—2	+1.42	−0.19	+49
−0.73	+94	+0.15	−4	+1.20	+0.08	+14
−0.25	+79	−0.30	−24	+1.48	−0.02	+36
−0 48	−58	−0.59	+8	−0.40	−0.12	+19
0.71	+77	+0.58	0	+1.31	+0.51	+17
0.33	−72	+0.48	−5	+1.55	+0.30	+14
—0.68	+166	+1.28	−20	+1.59	+0.74	+53
2.60	+886	+1.51	+78	+4.10	+0.98	+246
2.97	—283	+3.26	+11	+4.03	+2.95	+687
3.56	−143	+1.32	+2	+2.93	+1.13	+268
1.31	−186	+0.89	+57	+4.37	+2.49	+492
1.17	+234	+0.23	+2	+4.79	+1.47	+39
0.16	+3	−0.91	+2	+0.92	+0.55	+58
0.16	+10	−0.47	−12	+5.06	+0.48	+14
0.44	+33	+0.22	−4	+3.81	+0.70	+26

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Murshidabad	−0.09	−3.93	−11.7	−0.15	0.03	4.08	+1.28
Nadia	0.34	−2.38	−5.7	−0.15	0.02	1.79	+1.41
24-Parganas	3.35	−3.49	−2.9	−0.27	−0.07	0.27	+1.07
Howrah	1.45	−4.31	−8.7	−0.07	−0.12	−1.26	+1.01
Hooghly	0.49	−3.54	−5.0	−0.07	0	8.34	+1.44
Burdwan	4.57	−5.80	−8.6	−0.24	0	1.40	+1.30
Birbhum	0.06	−4.56	−5.0	−0.01	0.07	5.31	+1.10
Bankura	0.14	−8.12	−4.4	−0.42	0.17	1.27	+1.62
Midnapore	−0.07	−5.71	−4.5	−0.22	−1.15	−0.51	+1.46
Calcutta	0	−3.39	0	−	−	−	−
Purulia	+1.46	−17.57	+5.0	−0.57	+0.10	+3.42	+0.73
Sambalpur	+4.38	−16.99	−2.3	+1.16	+1.42	−7.49	+1.31
Sundergarh	+5.61	−19.05	+7.8	−0.44	−0.17	+7.55	+0.95
Keonjhar	+2.74	−14.45	+5.7	−0.41	−0.11	+9.07	+0.88
Mayurbhanj	+0.42	−18.46	−0.1	−0.35	−0.18	+8.99	+0.59
Balasore	−1.02	−5.05	−4.9	−0.70	−0.45	+9.46	+0.94
Cuttack	−1.17	−5.43	−9.8	−0.33	−0.37	+35.89	+1.06
Dhenkanal	−0.57	−11.25	−5.2	+0.02	−0.36	+20.66	+1.24
Baudh Khondmals	+1.96	−21.11	−6.6	−0.22	−0.29	+28.96	+1.07
Bolangir	+2.21	−14.58	−4.8	−0.32	−0.35	+14.78	+0.67
Kalahandi	+2.03	−10.92	−5.7	−0.83	−0.65	+22.60	+1.33
Koraput	+3.05	−18.96	−3.4	+0.66	−0.27	+13.65	+1.00
Ganjam	+3.00	−16.67	−5.4	−0.14	−0.13	+53.25	+0.56
Puri	+2.63	−5.72	−3.8	−0.13	−0.35	−51.72	+0.97

(9)	(10)	(11)	(12)	(13)	(14)	(15)
−0.83	−3	−0.50	−15	+3.63	+0.44	+45
0.77	+66	−0.11	+107	+4.07	+0.33	+27
−1.31	−1795	−0.13	+18	+5.97	+0.78	−15
−3.40	−1049	+0.61	+18	+3.69	+1.09	−4
−1.46	−513	−0.05	+8	+4.17	−0.04	+91
0.08	+317	−0.08	+8	+4.78	+1.23	+301
−0.13	−107	−0.05	+2	+4.49	+0.49	+21
−0.33	−18	−0.15	+21	+3.21	+0.50	+28
−0.33	−84	+0.21	−1	+5.60	+0.60	+55
1.90	−135	+5.10	+80	+1.01	+1.98	+2544
+1.05	−53	+0.75	+55	+3.71	1.03	+38
+2.70	+30	+1.75	+39	+4.18	+1.16	+225
+5.05	+2175	+2.65	+46	+6.75	+1.72	+600
+1.04	+52	+1.56	+9	+3.60	+0.67	+140
+0.52	+32	+0.65	+2	+3.88	+0.38	+71
+1.39	+43	+0.48	+4	+4.23	+0.64	+61
+1.79	+21	+1.41	+30	+6.61	+0.59	+309
+0.96	+37	+0.79	+8	+4.31	+0.61	+46
+0.38	+6	+0.93	+21	+2.09	+1.33	+125
+0.94	+42	+0.91	+7	+5.34	+0.56	+60
+0.74	+36	+0.41	+32	−7.81	+0.40	+73
+0.82	+414	+1.15	+16	+2.28	+0.80	+89
+0.83	+92	+2.03	+28	+3.10	+0.80	+104
+0.61	+92	+1.63	+3	+5.85	+0.78	+134

APPENDIX—J : Change in the Indicators of Economic

Districts	% of Urban Popu. in total Popu.	% of Workers in total population	% of Workers in non-agri. activities	Cultivable area per agri. worker	Net area sown per agri. worker	Area sown more than once as % to net area sown	Average daily wages of Agri. workers	% of Total workers in manufacturing
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Patna	13	21	35	43	27	38	1	40
Gaya	30	29	11	9	12	42	45	36
Shahabad	21	23	38	12	14	41	6.5	33
Saran	38	26	32	45	17.5	34	3	12
Champaran	25	19	19.5	44	20.5	8	2	32
Muzaffarpur	23	6	34	26.5	35	19	10	25
Darbhanga	34	17	41	30	32	31	14.5	29
Mongher	22	24	39	32.5	39	22	17	22
Bhagalpur	35	27	42	32.5	36	12	14.5	42
Saharsa	24	28	18.5	10	19	5	5	37
Purnea	31.5	18	45	25	16	40	40	39
Santal Parganas	28.5	44	16	5	4	44	21.5	20
Palamu	40	35	23.5	8	25	28	4	27.5
Hazaribagh	5	41	7	4	7	39	9	41
Ranchi	7	46	5	1	2	36	28	5
Dhanbad	1	34	1	6	5	43	6.5	3
Singhbhum	3	40	6	2	3	45	12	2
Darjeeling	43	20	8	20.5	26	35	25	8
Jalpaiguri	26	22	15	17.5	11	20	23	9
Cooch Behar	44	7	31	38.5	6	10	39	30.5
West Dinajpur	17	10	44	41	8.5	21	34	30.5
Malda	36.5	13	46	36.5	10	16	26	24

Development, 1961 to 1970-71 (Ranks)

Workers in Regd. working fact. per lac of Popu.	% of Total workers in trade and Commerce	Hosp. beds per lac of population	Percent Literacy	% of Total workers in transport	No. of Vehicles on road per lac of population	Agri. activities	Industrial activity	Transportation activity
(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
35	13	16.5	37	39	10	38	43	23.5
11	17.5	18.5	29	36	36.5	36.5	25.5	42
30	26	41	28	38	18	10	35	28
33	34	39.5	42	37	32	27	20	39
36	31	42	36	42	22.5	11.5	39	33
22	29.5	37	44	40.5	25	17	25.5	34
29	41	32	39	35	33.5	35	34	38
24	33	35	35	46	24	39	22.5	40
8	32	37	40	40.5	43	20.5	29	45
12	42	46	34	43	30	1	27.5	43
34	45	21.5	45	45	40	44	41	46
13	22	33	38	26	41	11.5	13	35.5
37	23.5	39.5	33	34	43	8	36	44
5	11	45	32	17	22.5	3	22.5	16
2	8	3	16	12	8	9	2	8
43	2	16.5	18	1	2	5	22.5	1
6	10	29	27	9	7	6	3	6
41	16	4	11	2	4	34	27.5	3
42	27	29	8	5	28	2	30.5	14
26	46	29	43	25	21	18	33	20
23	43	43	7	29	43	31.5	32	41
19	28	37	20	18	36.5	6	18.5	26

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Murshidabad	42	3	43	32.5	20.5	24	21.5	43
Nadia	31.5	1	29.5	32.5	22	27	16	18
24-Parganas	8	3	13	24	17.5	26	30.5	44
Howrah	19	8	37	41	30	33	27	46
Calcutta	39	2	9	—	—	—	—	6
Hooghly	27	4	25.5	41	23.5	17	13	45
Burdwan	4	16	36	26.5	23.5	29	20	34
Birbhum	36.5	9	25.5	38.5	15	23	29	35
Bankura	33	25	19.5	17.5	8.5	30	8	38
Midnapore	41	14	21	28.5	33	32	11	27.5
Purulia	18	38	4	15	14	25	41	10
Sambalpur	6	37	12	3	1	37	19	4
Sundergarh	2	43	2	16	28	18	36	1
Keonjhar	11	32	3	19	29	14	28	11
Mayurbhanj	28.5	39	10	20.5	34	15	43	23
Balasore	46	11	23.5	14	44	13	37	7
Cuttack	20	12	40	22	43	3	32	17
Dhenkanal	45	31	27	11	42	7	24	13
Baudh Khondmals	16	45	33	28.5	38	4	30.5	26
Bolangir	14	33	22	23	40.5	9	42	14
Kalahandi	15	30	29.5	13	45	6	18	19
Koraput	9	42	14	7	37	11	33	16
Ganjam	10	36	28	35	31	1	44	15
Puri	12	15	17	36.5	40.5	2	35	21

(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
27	44	44	23	30	27	25	40	29
14	38	1	17	33	35	22	12	37
46	39	13.5	3	15.5	46	23.5	45	32
45	21	13.5	22	10	45	45	46	27
40	1	2	41	3	1	—	22.5	2
44	35.5	21.5	15	44	14	19	44	30
4	37	21.5	9	7	6	26	15.5	5
39	35.5	29	10	28	39	33	42	35.5
28	40	11.5	25	27	33.5	7	38	31
38	29.5	34	5	22	31	31.5	37	25
32	19	5	21	11	29	20.5	17	17
21	5	7	14	8	9	4	7	7
1	3	6	1	4	3	23.5	1	4
15	7	18.5	24	19	11	28.5	8	13
20	20	27	19	32	17	41	18.5	23.5
31	23.5	25	13	20	19	36.5	15.5	15
7	9	9	2	23	5	28.5	5	11
17	17.5	21.5	12	21	26	14	9.5	21
25	14	11.5	31	6	38	30	30.5	18.5
16	15	24	6	24	20	43	95	18.5
18	25	8	46	31	16	13	14	21
3	12	15	30	13.5	15	15	4	11
9.5	4	10	26	13.5	13	40	6	9
9.5	6	26	4	15.5	12	42	11	10

APPENDIX—K : **Calculation of Spearman's Correlation Coefficients**

Districts	Ranks		X_1Y_1		Change in level of eco. dev. 61-71	Change in Share in total Mig. 61-71	X_2Y_2	
	Levels of Eco. Dev. '71 X_1	Share of Male Mig. (%) Y_1	d_i	d_i^2	X_2	Y_2	d_i	d_i^2
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Patna	11	27	−16	256	30	5	15	225
Gaya	32	39	−7	49	29	18	11	121
Shahabad	18	43	−25	625	33.5	16	17.50	306.25
Saran	46	46	0	0	43	12	31	961
Champaran	38	41	−3	9	35.5	19	16.50	272.25
Muzaffarpur	45	45	0	0	33.5	22	11.50	132.25
Darbhanga	43	44	−1	1	45	24	21	441
Mongher	25	42	−17	289	41	20	21	441
Bhagalpur	21	40	−19	361	44	17	27	729
Saharsa	44	37	9	81	37	36	1	1
Purnea	41	18	23	529	46	44	2	4
Santal Parganas	37	38	−1	1	32	13	19	361
Palamu	39	34	5	25	40	21	19	361
Hazaribagh	28	26	2	4	17	11	6	36
Ranchi	13	32	−19	361	4	8	−4	16
Dhanbad	7	4	3	9	3	31	−28	784
Singhbhum	16	17	−1	1	6	30	−24	576
Darjeeling	2	2	0	0	12	39	−27	729
Jalpaiguri	9	3	6	36	15	37	−22	484
Cooch Behar	24	7	17	289	39	40	−1	1
West Dinajpur	30	13	17	289	38	38	0	0
Malda	35	22	13	169	31	32	−1	1
Murshidabad	27	29	−2	4	42	27	15	225

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Change in Share of Male Migts. 1961-71, Y_3	X_2Y_3		% Increase in Total Migrants 1961-71, Y_4	X_2Y_4		% increase in Male Migrants 1961-71, Y_5	Y_2Y_5	
	di	di²		di	di²		di	di²
(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
26	4	16	18	12	144	35	5	25
30	—1	1	22	7	49	33	—4	16
38	—4.5	20.25	16	17.5	306.25	36	—2.5	6.25
36	7	49	17	26	676	41	2	4
42	—6.5	42.25	31	4.5	20.25	39	—3.5	12.25
41	—7.5	56.25	33	0.5	25	43	—9.5	90.25
32	13	169	34	11	121	38	7	49
35	6	36	39	2	4	37	4	16
46	—2	4	19	25	625	46	—2	4
45	—8	64	23	14	196	44	—7	49
43	3	9	44	2	4	40	6	36
22	10	100	20	12	144	23	9	81
39	1	1	15	25	625	32	12	144
16	1	1	7	10	100	14	3	9
14	—10	100	8	—4	16	9	—5	25
2	1	1	14	—11	121	18	—15	225
27	21	441	37	—31	961	26	22	484
25	—13	169	38	—26	676	26	—14	196
29	—14	196	21	—6	36	22	—7	49
40	—1	1	11	28	784	20	19	361
37	1	1	10	28	784	24	14	196
28	3	9	24	7	49	29	2	4
1	41	1681	27	15	225	1	41	1681

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Nadia	9	15	—6	36	19	43	—24	576
24-Parganas	12	10	2	4	16	41	—25	625
Howrah	4	9	—5	25	28	45	—17	289
Calcutta	1	1	0	0	5	46	—41	168
Hooghly	5	11	—6	36	23	42	—19	361
Burdwan	3	6	—3	9	14	35	—21	441
Birbhum	20	21	—1	1	35.5	23	12.5	156.25
Bankura	19	37	—19	324	26	28	—2	4
Midnapore	26	28	—2	4	27	29	—2	4
Purulia	22	30	—8	64	11	26	—15	225
Sambalpur	9	8	1	1	2	14	—12	144
Sundergarh	6	5	1	1	1	—7	—6	36
Keonjhar	29	14	15	225	9	2	7	49
Mayurbhanj	42	23	19	361	24	5	19	361
Balasore	33	36	—3	9	22	6	16	256
Cuttack	14	19	—5	25	7	33	—26	676
Dhenkanal	31	25	6	36	20	34	—14	196
Baudh Khondmals	34	16	18	324	35	10	15	225
Bolangir	36	31	5	25	18	9	9	81
Kalahandi	40	20	20	400	21	25	—4	16
Koraput	23	12	11	121	10	1	9	81
Ganjam	17	24	—7	49	13	3	10	100
Puri	15	33	—18	324	8	4	4	16

$\Sigma di^2 = 5792$ $\qquad\qquad$ $\Sigma di^2 = 13807$

(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
31	—12	144	30	—11	121	27	—8	64
34	—18	324	25	—9	81	31	—15	225
44	—16	256	45	—17	289	45	—17	289
16	10	100	46	—4	1681	42	37	1369
33	—10	100	41	—18	324	34	—11	121
23	—9	81	28	—14	196	25	—11	121
19	16.5	272.25	29	6.5	42.25	17	18.5	342.25
24	2	4	35	—9	81	30	—4	16
18	9	81	26	+1	1	15	12	144
17	—6	36	42	—31	961	21	—10	100
3	—1	1	13	—11	121	7	—5	25
5	—4	16	40	—39	1521	6	—5	25
7	2	4	2	7	49	5	4	16
11	13	169	6	18	324	11	13	169
21	1	1	5	17	289	13	9	81
4	3	9	32	—25	625	2	5	25
13	7	49	36	—16	256	12	8	64
6	19	361	9	16	256	10	15	225
20	—2	4	12	6	36	16	2	4
12	9	81	43	—22	484	19	2	4
8	2	4	1	9	81	4	6	36
10	3	9	4	9	81	8	5	25
9	—1	1	3	5	25	3	5	25

$\Sigma di^2 = 5275$ $\quad\quad\quad$ $\Sigma di^2 = 14502$ $\quad\quad\quad$ $\Sigma di^2 = 7278$

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